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The INDUSTRIAL-ARTS MAGAZINE

JANUARY-1927

The BRUCE PUBLISHING COMPANY
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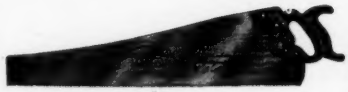
ATKINS SILVER STEEL SAWS

A Perfect Saw for Every Purpose



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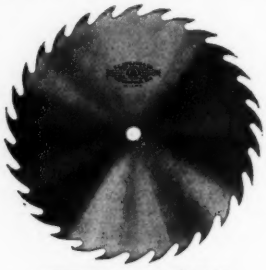

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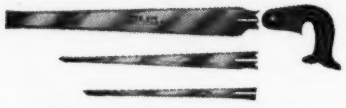
For your circular saw table Atkins Silver Steel Circular Saws cannot be beat. The results from using Atkins will prove absolutely that they are "The Finest On Earth."

ATKINS NON-BREAKABLE BLADE
To those who have suffered a heavy loss on account of breakage the Atkins Non-Breakable Hack Saw Blade will prove extremely profitable.



ATKINS No. 3 NEST OF SAWS
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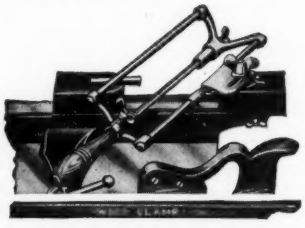

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THE INDUSTRIAL ARTS MAGAZINE

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FIFTY YEARS OF WOODWORKING IN THE AMERICAN SCHOOLS

Paul E. Klein, San Diego, California

AS AN INSTRUCTOR in woodworking in the public schools, I have been interested in the development of this subject in the schools of America. Woodworking has been called by so many names—"Manual Training," "Sloyd," etc.—has taken so many forms, used such diverse methods, and exhibited such striking characteristics at different times, that it seems to me it might be well for one engaged in teaching this subject to get a connected view of its evolution. For convenience, I have divided the time covered in this study into periods or intervals in which some idea or theory was dominant. Chosen arbitrarily, these periods overlap, and the influence of all still persist in varying degrees. Emphasis in this paper will be placed upon the presentation of typical designs of "projects" or "exercises," upon books and teaching manuals published at the various times, upon methods used, and upon the theories advanced from time to time supporting the forms of woodwork.

The Manual Labor Movement. The first evidences we have of any shop instruction given in an institution in America was in the "Manual Labor" Institutes about the year 1820. Joseph Neef and William MacClure brought over from Europe ideas in this line which they had received from the schools conducted by Fellenberg in Germany and Switzerland. These institutes were semi-charitable institutions, founded by denominational and philanthropic societies, in which poor boys might earn their education by doing manual work of a general nature about the place. Little attempt was made to put this instruction into real educational form.

Worcester, Mass., Free Institute for Youth, organized in 1865, was the first to make a real educational attempt in shop instruction, stating in its charter that the "aim of this school shall ever be instruction in those branches of education not usually taught in public schools, but which are essential and best adapted to train the youth for practical life."

About 1820, the "industrial revolution" had broken up the home and village industry, and built up a city population. On the farm the boy had learned to mend the wagons, repair the harness, and do other manual work, and it was thought that these manual institutes would give boys training of this nature. But by 1840 most of these institutions had died out. "Their backers had been too enthusiastic in their pronouncements that this work would support the classical school upon which it had been grafted." In the West, however, some of these institutes continued. In Illinois particularly, one of these furnished the nucleus of what later became the Illinois Industrial University.

Early Technical Training in Higher Institutions. By 1850 the frontier was about gone. The "industrial revolution" gave the opportunity for wealth and advancement through manufacturing as well as the developing of new country. "And in these pursuits skill and technical knowledge played

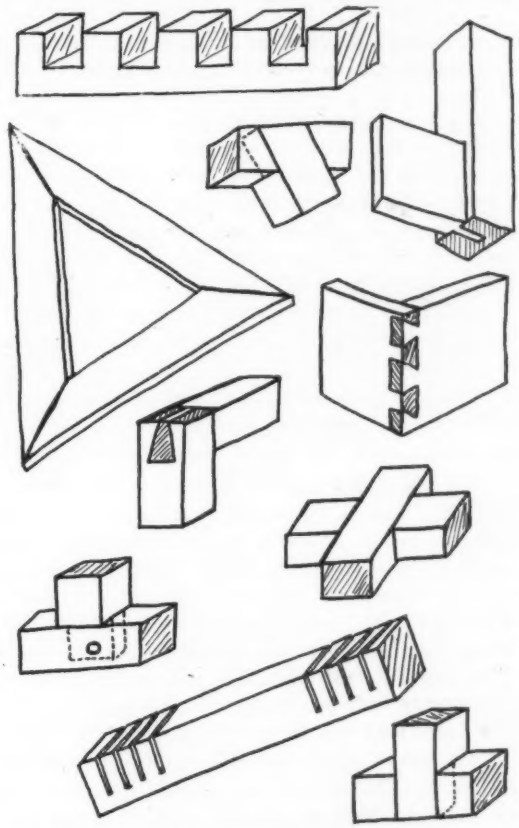


PLATE 1. TYPICAL RUSSIAN SYSTEM EXERCISES.
(Taken from Bulletin No. 3, 1923, U. S. Bureau of Education.)

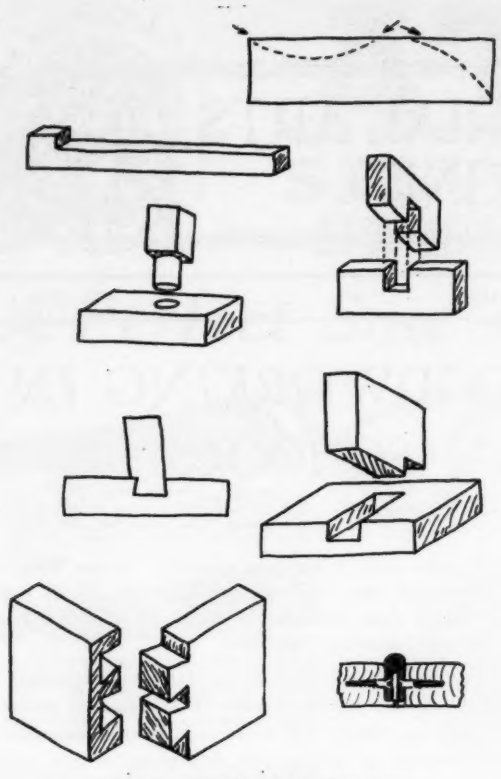


PLATE 2. EARLY SLOYD EXERCISES.
(From "Hand Book of Sloyd," by Solomon.)

a great part." In 1870, the University of Illinois added woodworking to the architectural course. The Stevens Institute of Hoboken, N. J., followed in 1871. The following year, the Polytechnic School of Washington University in St. Louis put in a regular course in woodworking. In connection with this, drawings were made to scale from given sketches.

The Morrell Act of 1862, giving land grants for the establishment of mechanical and agricultural colleges, added impetus to this movement, and the Colorado Agricultural College, Illinois Industrial University, College of Mechanical Arts of Cornell University, Agricultural and Mechanical College of Texas, and Boston Institute of Technology were soon established.

Little is known of the nature of the woodworking offered in these higher institutions, but there is no question that it was very technical, and perhaps very formal.

The "Whittling Schools" Movement. Contemporaneous with this work in the higher institutions, but providing work for boys at an earlier age level, were the "whittling" schools for city boys. The Boston Whittling School opened in 1872 was the best known of these. Sessions were held during the winter months for boys of 12 to 16 years of age. Twenty-four lessons in whittling and wood carving were given. These lessons were so arranged as to give the greatest amount of instruction with the least expenditure of tools and materials. The pocket knife was the tool used to the largest extent.

No other subjects were offered in connection with this tool work. The aim was to give general handiness, to give the students wholesome enjoyable work of a type that they would normally engage in, and the value was placed in the activity rather than the tool processes. As a rule, these schools were backed financially by a private group of men interested in such work.

The First Real Instructional Woodworking. Two foreign systems of woodworking had a great effect upon the type of instruction given in this country, gave the first real impetus to this subject, and left an influence which is still felt. The "Russian Exercises" system was known in this country as early as 1873, but in 1876 an exhibition of the work of the Imperial Russian Technical School at the Centennial Exposition in Philadelphia, created a real interest in this form of technical instruction. As shown by plate 1, the "Russian Exercises" were a series of abstract exercises, arranged in a logical manner, very technical, and calling for very exact measurements and tool execution. It was felt that these exercises were fundamental, that is, created a foundation, to all forms of advanced technical study. Another point about this system was that group instruction was possible, from 25 to 35 boys could be handled at one time by one instructor. It was welcomed, therefore, by the educators of the time, who, though they did not favor specific trade training in educational institutions, were aware of the growing demand for some sort of technical education on the part of the expanding manufacturing groups in this country. They felt that this system offered a good *general* mechanical training.

While given at first in the form shown by Plate 1, the scheme was modified later in an attempt to make it more pedagogical, by the introduction of "scroll saw" work, and "slip" or "flat" work—the making of joints in the flat, using thin wood.

At first we find no books dealing with this system of woodwork instruction, dependence resting upon models and

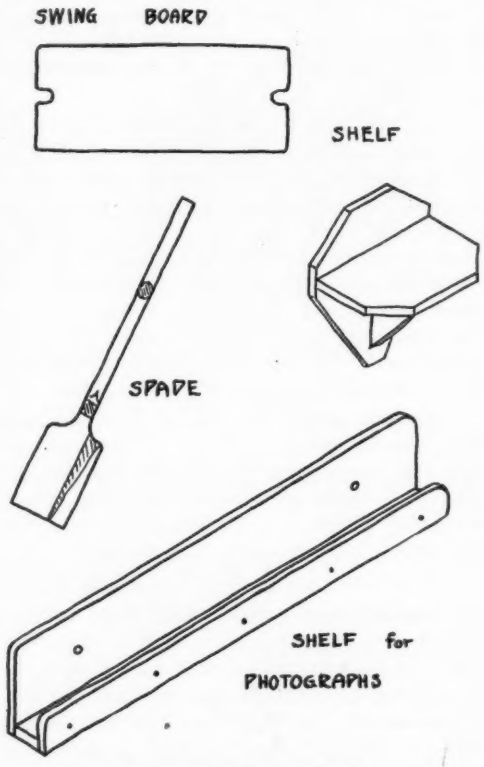


PLATE 3. LATER SLOYD PROJECTS.
(From "Elementary Sloyd & Whittling," by Larsson.)

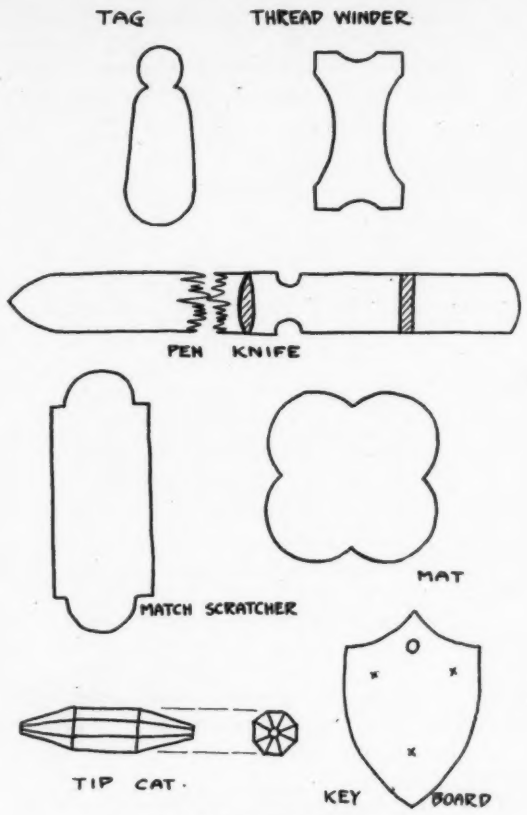


PLATE 4. SLOYD WHITTLING PROJECTS.
(From "Elementary Sloyd & Whittling," by Larsson.)

charts. "Woodworking Tools—How to Use Them"—by Ginn, Heath & Company, and "Bench Work in Wood," by Goss, printed in 1882 and 1887, show this type of work. The University of Chicago shops have a collection of the work done under this system, inherited by them from the old Chicago Manual Training School.

The Swedish "Sloyd" system was the second foreign contribution to our educational woodworking, and its new element was *interest*. As they said, "the objects (are) chosen with special reference to the interests of the boy."[2] America received the first glimpse of this system at the Cotton Centennial Exhibition at New Orleans in 1885, where the work done in the school of Dr. Otto Salomon at Naas, Sweden, was shown. But it was not until 1888 that definite work in this line came into use in this country.

The characteristics of the "sloyd" system may be summed up by stating that individual instruction was employed; at first exercises (see Plate 2) were used as preliminary to the models or useful projects; the work was mainly in this wood; and physical exercise was strongly emphasized—hence the positions and movements made while the student was employed with tools, were carefully worked out. Educators welcomed "sloyd" because of the three values—the interest element, the utility element, and the physical development element. The aim of "sloyd," as stated by Dr. Salomon, himself, was "pleasure in bodily labor, and respect for it. Habits of independence, order, accuracy, attention, and industry. Increase in physical strength, development of the power of observation in the eye, and of execution in the hand . . . . . development of mental power, or in other words, it is disciplinary in its aim."[1]

As first received, it was a bit formal in its manner of presentation, there were 88 exercises and models, and these were presented in a very inflexible order and manner. Gustaf Larsson, the great exponent of sloyd in this country, deserves much credit for his modification of this rather formal, but very fine, work. Plates 3 and 4 illustrate some of his projects and ideas. We have many books and publications on sloyd, as:

(1) "The Teachers' Handbook of Sloyd," by Dr. Otto Salomon, printed in this country in 1891 from a translation of his Swedish book.
(2) "Preliminary Sloyd," by Gustaf Larsson, 1893.
(3) "Elementary Sloyd and Whittling," by Gustaf Larsson, 1906.
(4) "Sloyd Correct Position Charts," which were hung on the wall of the classroom.

The "Manual Training" Movement. The two foreign systems mentioned above had great influence upon the type of woodworking instruction presented in the schools of America, but it must be remembered that actual woodworking instruction had begun in this country in higher institutions as early as 1870. However, extensive instruction among boys did not begin until about 1880. The directors of Washington University of St. Louis, where technical instruction had been given college students since 1870, opened in 1880, under the direction of Dr. C. M. Woodward, a school for boys, the St. Louis Manual Training School. Under the wise and energetic leadership of Dr. Woodward, who went about lecturing and demonstrating the success of the methods used in this institution, this school became well known, and was the inspiration for the starting of similar schools. At first these were backed by private funds—for example, the Chicago Manual Training School was backed by the Chicago Commercial Club—but

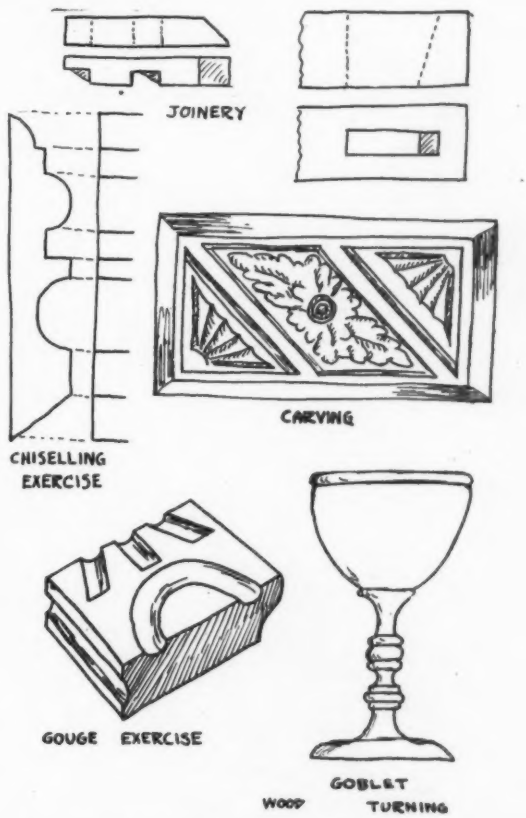


PLATE 5. EARLY MANUAL TRAINING EXERCISES.
(From "Manual Training," by C. M. Woodward.)

soon the public schools began putting this work into their high and grammar grades. Below is a tabulation of those which seem from a study of various sources, to have been among the pioneers offering manual training:

PLACE	DATE	REMARKS
PRIVATE SCHOOLS		
St. Louis Manual Training School	1880	—Leadership Dr. Calvin Woodward.
Chicago Manual Training School	1883	—Leadership Dr. Henry Holmes Belfield.
Toledo Manual Training School	1884	—
PUBLIC HIGH SCHOOLS		
Baltimore High School	1883-4	—
Eau Claire High School, Wisconsin	1884	—
Toledo High School	1884	—
College High School, New York	1884	—Another high school in N. Y. in 1885 put in a "M. T. Tool House."
Philadelphia High School	1885-6	—
Omaha High School	1885	—
PUBLIC SCHOOLS		
Boston, New Haven, Chicago, Cleveland, and Moline	By 1886	—
PUBLIC ELEMENTARY SCHOOLS		
New York	1887	—First in the elementary schools.
Thirty-seven cities	By 1890	—Had some form of Manual Training in public schools.
Ninety-five cities	By 1894	—Had some form of Manual Training in public schools.
Two hundred cities	By 1900	—Had some form of Manual Training in public schools.

The characteristics of this early manual training may be summarized by stating that it combined the abstract exercises of the Russians with the useful models of the sloyd; it was very formal, with elaborate tool analysis; much of the work was highly decorated in crude geometrical designs. Plates 5 and 6 illustrate the work of this period. There was a great public demand, looking toward some instruction of this nature in the schools of this country. President E. E. White of Purdue University called attention in 1880 to "the decay of the apprenticeship system, which has been our chief reliance for the training of artisans. It is becoming more and more evident that if this is not made good by technical training in some efficient form, the American manufacturer will be at the mercy of the skilled labor of Europe. The day of muscle in industry is passed, and the day of mind with skill of eye and hand has dawned."[93]

Yet, as presented in the schools, the purpose of this work was general rather than specific training. President White continues: "The primary and important duty of public schools is to provide training and teach knowledge of general application and utility. It recognizes no class distinctions—social or industrial. The elements of technical knowledge

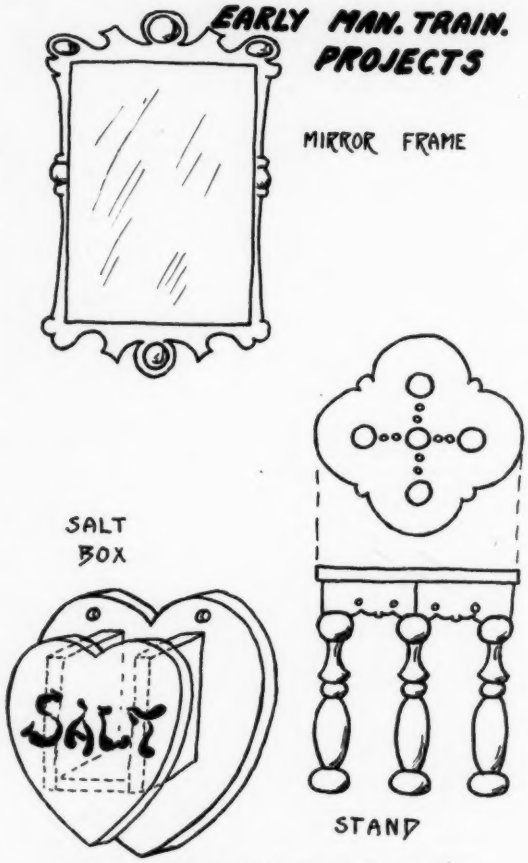


PLATE 6. EARLY MANUAL TRAINING PROJECTS.
(Based on the mode of the period.)

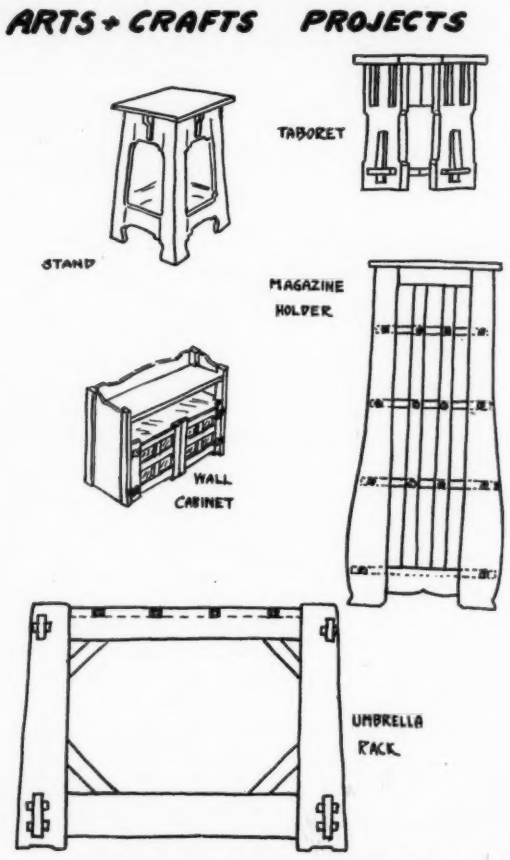


PLATE 7. ARTS AND CRAFTS PROJECTS.
(From "Furniture Design" and "Problems in Furniture Making," by Crawshaw.)

which are of general application and utility may clearly be taught in the public school." Dr. Woodward, the great leader in this period of shop instruction, said "its object is to make men, not machines—to educate." Another writer said: "The training of the brain and the hand—the mental and the physical—being the two great orders of faculty which make up the whole man."[7] A very good statement of the purpose of manual training was made by Sickels:[5] "Manual Training has a place in the regular courses of study. By means of it, the reasoning power is more easily awakened; knowledge of objects and facts connected with them more readily understood and remembered; and above all, the accuracy and precision demanded by this (manual training) lead to closer observation and exactness in others; (also) an aid to mental development."

Books of this period are:

(5) "Exercises in Woodworking," by Sickels, printed in 1890.
(6) "Proceedings of the N. E. A.," page 223—1880; speech of President E. E. White of Purdue University.
(7) "Manual Training in Education," by J. V. Blake, printed in 1886.
(8) "Manual training," by C. M. Woodward, printed in 1905 by Orr & Lockett Hdwe. Co.
(9) "Woodwork," by S. E. Ritchey, published in 1893.
(10) "Wood Turning," by Ross, published in 1909.
(11) "Bench Work in Wood," by Goss, published in 1887.
(12) "Manual Training," by C. M. Woodward, published in 1890.
(13) "Wood Carving," by Gustaf Larsson, 1893—chip carving in connection with sloyd.
(14) "Chip Carving," by T. V. Morse, published in 1903.
(15) "Wood Carving in Its Many Branches," Hodgson, 1905.
(16) "Wood Carving," Cassell, 1913.
(17) "Twenty-one Years of Manual Training," by Dr. James P. Haney in "Manual Training" Magazine for February, 1911.
(18) "Manual Training and Wood Turning," by M. J. Golden, printed in 1897.

As indicated by titles Nos. 13, 14, 15, and 16 of bibliography, chip carving was used to some extent as a means of decoration. Plates 5 and 8 contain examples of it, which have been popular up to this time.

The Arts and Crafts Movement. This movement, spreading over this country from about 1900 on, originated in England under the leadership of William Morris. It arose as a protest against the machine made ugliness of the period. It was an effort to bring back beauty—in the home, the furniture, clothes, everything. Its leaders harked back to the old guild system, where everyone made things by hand, expressing his own individuality through his craftsmanship. It associated design and construction into a serviceable and pleasing whole. It demanded beauty in line, in proportion, and in finish. Perhaps it went a little too far—there is no question that much of the work done was somewhat heavy and crude, and that some articles having utilitarian purposes only, were too "craft" appearing, but this was far outweighed by the benefits it brought. Its keynote was simplicity, and good proportions, and its designs have persisted to the present time.

Books of this period are:

(19) "The Arts Crafts for Beginners," F. G. Sanford, 1904.
(20) "Selected Shop Problems," Geo. A. Seaton, 1910.
(21) "Problems in Furniture Making," F. D. Crawshaw, 1912.
(22) "Furniture Design for Schools and Shops," Crawshaw, 1914.
(23) "Handwork in Wood and Metal," Hooper & Shirley (England), 1913.

A GRADING METHOD FOR PRINTING CLASSES

Norman C. Tock, Instructor of Printing, Creston High School, Grand Rapids, Michigan

MUCH OF THE VARIATION and irregularity, which must be taken into consideration in giving a manual training grade, can be taken care of by putting the grading system on a point basis. Such a point system can be briefly described in these three statements: A certain number of points is credited to the pupil for every piece of work done. For defective quality, a certain number of points are subtracted from the pupil's total as fines. For the display of proper shop habits, care of tools and equipment, meeting extra assignments, etc., a bonus of additional points is given. At the end of the grading period, which in Grand Rapids is five weeks, the pupil with the highest total of points is given a high grade, while the pupil with the lowest number is usually given a below-passing grade. A method of grading like this is fair, convenient, objective, and has an excellent effect on the pupil.

The scale which follows, showing the number of points to be given for the different kinds of printshop work, is the important element of this article. I wish to precede it, however, with a short description of the conditions which were held in mind while working out the scale for Creston High School.

An excellent equipment makes it possible to carry on a large variety of work at Creston. Most of the production work is done by senior pupils. It is in the grading of these production work classes that the scale is most appreciated, but it is used in all other classes also. Most classes have about 24 pupils.

Each class has a secretary and two foremen, appointed by the instructor. The secretary takes the roll, enters orders in the order book, and helps with keeping records. The foremen are given as much responsibility as they can be trained to carry, but are always closely supervised and guided by the instructor. They watch the progress of jobs through the shop, help in keeping records, and are especially entrusted with the duty of checking over the condition of shop and equipment at the close of the period. These three assistants are carefully chosen; they feel that their position is a high honor and act accordingly. In return for their extra work and to make up for the time they lose from productive work they receive a bonus of 50 points a week. Their duties in keeping the records will be brought out by a study of the scale.

There are three problems which are peculiar to the printshop, which this scale seeks to help solve. The first is the problem of grading production work, that is, work printed in some quantity for the school, such as report cards, excuse blanks, advertising posters, and the school paper. The problem lies in properly evaluating the difficulty of the different jobs and the relative merit shown by the pupils in producing them. The scale given here seeks to classify the jobs most common in the Creston shop according to relative difficulty and assigns more points to the more difficult jobs.

The second peculiar situation is the uniformity of the final product. The quality of the printed matter coming from the shop will depend on the teacher and the correcting and supervising which he does, to a greater extent than it will depend on the ability of the pupil. The teacher can hold up the printing of a job until corrected and perfected to his satisfaction. As a result of this situation the teacher must be on guard against grading his own work and giving pupils credit for it. A grade on quality should be given as soon as the pupil hands the work in as satisfactory. Then it is up to the teacher to mark mistakes, assess fines for them, and supervise their correction, which the pupil does on his own time. A short spell of this kind of correction puts pupils on their mettle and results in a greater watchfulness for mistakes.

The third problem of grading lies in the fact that the different fields of printing are so clearly separated from one another, the ability of any pupil in one field being no indication of what he can do in another. This is provided for in the scale by making the rate for an average pupil in one department the same as the rate for an average boy in another department. The composing room average is expected to be fifty points per hour. The same rate is planned for the press room. Where too great a difference develops in the number of points earned in the different departments changes are made to equalize them. Such changes in the scale are bound to be necessary as equipment, preparation of pupils, and teaching methods will change from time to time. It will take a number of years to get the scale to working with approximate satisfaction in all particulars, but in its present form it is better to use than most systems.

While the various departments are expected to balance each other, the more difficult and unpleasant individual jobs in each field are rated higher than the easy work in order to make it worth while for the pupil to learn the harder tasks.

I wish to acknowledge the assistance of Mr. Harry P. Buboltz, printing instructor at Ottowa Hills High School, Grand Rapids, in lending me his extensive notes which were very helpful in the preparation of the scale. Much of his information was gained by personal visits to commercial plants. Since the scale follows commercial rates for similar work so far as practicable, the value of this information can be appreciated.

It is not possible to follow commercial rates exactly, even if a full list of commercial prices were available, because of the different conditions confronting us. However, the few commercial prices we did have were valuable in checking the scale and in reaching estimates as the following example will show.

The commercial rate for hand composition is about $2.50 per hour. A good compositor will easily set 800 ems per hour of straight matter in the usual body type sizes. An average boy will set 200 ems or one-fourth as much as the commercial compositor. Allowing 50 cents of the commercial price for the distribution, we arrive at the figure of 50 cents per hour as representing a fair wage to the boy. In terms of our scale we therefore expect a compositor to earn 50 points per hour. Rates for other departments are figured at the same rate.

The scale of points is posted on the bulletin board and contains all the information the pupil will need, as follows:

GRADING SCALE

Notice!

For each piece of work you do you will receive a certain number of points as indicated by the list following.

For mistakes and defective work you will be fined a certain number of points which are also listed in the following.

For cooperation, independence, care of shop and equipment, and for the performance of any outside duties assigned to you such as reading, writing themes, etc., you will be given a certain number of points equal to about 20 per cent of your grade for work done.

The responsibility of keeping track of your work rests on you. Follow these directions.

Keeping Track of Your Work

Composition:

Take a proof of the finished job, sign it with your name and class. Place on teacher's spindle.

Distribution:

Same as composition, but write the word distribution on the proof.

Distribution of Pi:

Keep track of your time in minutes and make out a slip to show time. Get teacher's O.K. on slip and leave on spindle.

Imposition:

Make out a slip showing size of form, size of chase, number of pages, and get foreman's O.K. Teacher will check your work before grading. Leave slip on spindle.

Makeready:

Take an impression, sign same as for composition, and leave on spindle. Your grade depends on this first impression. Correcting will be done on your own time.

Feeding Press:

Keep accurate count of impressions. Have foreman enter that number on his report at end of period.

Paper Cutting:

Get teacher's O.K. on your diagram of cuts before cutting. Have teacher inspect the work as soon as you finish cutting, get his O.K., and leave diagram on spindle.

Other Operations:

Make out a slip, including necessary information, and after getting foreman's O.K. leave on spindle.

COMPOSITION

Figuring amount set:

Rate is based on number of ems set. To find number of ems set find area in square picas of type (subtracting area of leads from area of form) and multiply as follows:

12 point type multiply by 1.00
10 point type multiply by 1.44
8 point type multiply by 2.25
6 point type multiply by 4.00

Rates for composition:

Straight composition, ordinary	25 points per 100 ems
Straight composition with mixed fonts	30 points per 100 ems
Poetry	20 points per 100 ems
Two column tabular, one font	35 points per 100 ems
Two column tabular, mixed fonts	40 to 50 points per 100 ems
Three column tabular, one font	40 points per 100 ems
Three column tabular, mixed fonts	50 to 60 points per 100 ems

Composition with rules: Rates per 100 square picas:

Class A ..... 37 plus 5 for mixed fonts
Includes simplest forms with rules inserted for writing in name, address, date, etc., such as excuse blanks, library permits, and tardy blanks.

Class B ..... 40 points
Including simple blanks with cross and down rules and larger size types.

Class C ..... 50 points
Including more complicated blanks with cross and down rules and smaller type.

Class D ..... 40 or 50 points
Includes double form blanks, of either simple or complex nature. Figure same as Class B or C but figure each form separately.

Display Composition: Rate per 100 square picas:

Class A ..... 20 points
Open display with much white space, no small type. Examples, handbills, posters, title pages, ads, tickets.

Class B.....40 points
Medium display, some small type, rule borders, panels, ornaments, etc.
Class C.....25 to 30 points
Matter with space taken up by cut, or large ornaments.
Class D.....
Closely set ads, circulars, menus, programs, etc., where small type is used and some lines are displayed. Same credit as straight composition plus 5 points per 100 ems.

Making up Pages:
Linotype only, no hand set lines, 5x7 or smaller.....20 points
Hand set straight matter, 5x7 or smaller.....33 points
Linotype with some lines to be set by hand or with other extra work, 5x7 or smaller.....66 points
Larger pages at the rate of 100 points per 100 square inches.

Imposition:

You are expected to make adjustments if two or three lines fall in straight composition or if some more extensive adjustments are necessary in more complex forms, but you are not to spend an unreasonable amount of time making adjustments due to careless work on the part of the compositor.

For trying out a form which has to go back to the compositor for correction.....10 points
Class A.....Simple forms, straight matter, tickets, etc.
Class B.....Class A with rule borders or a few rules inserted
Class C.....Pages with cuts, rule panels, ruled blanks
Class D..Two form work and turn, two on, register, large rule blanks

	Single Pages Chases		Double Pages Chases	
	10x15 or smaller	15x21	10x15 or smaller	15x21
A	33	44	44	66
B	44	66	66	88
C	88	96	96	120
D	150	175	200	220

Makeready: Classes same as for imposition.
Tickets.....25 points
Class A.....50 to 60 points
Class B.....70 to 90 points
Class C.....80 to 100 points
Class D.....100 and up

Makeready is so variable a factor that at times you will be put on a rate of 50 points per hour, no matter what class or size the form may be.

Washing Presses:
10 x 15 Gordons.....10 points
15 x 21 Golding.....20 points
5x8 Pearl.....8 points
Hand press.....8 points
Proof press.....8 points

Feeding Press:
Small cards or easily fed sheets.....100 points per M
5 x 7 sheets to 12 x 20.....130 points per M
12 x 20 or larger.....150 points per M
Add 25% for flimsy paper.
Add 25% for register work.

Paper Cutting:
Minimum, 25 points. More than two cuts, 3 points for each extra cut. More than one lift, 5 points for each extra lift. Ordinarily one ream of paper, or 100 sheets of card constitute a lift.

For counting out stock, and handling stock, 5 to 10 points if the size of the job warrants it.

Trimming stock, booklets, etc., 5 points each cut.

Wrapping and delivering, 10 points per package.

Gathering:
75 points per M for small sheets.
150 points per M for sheets larger than 8½x11.

Hand Numbering:
Straight.....125 per M
Line.....150 per M
Paging.....200 per M

Padding: 2 points per pad of 100 sheets (when pads are made two on and cut, add 5 points for each cut but count pads same as if they were not cut).

Perforating: 75 to 100 points per M for single line perforation. Proportionately more for multiple lines.

Punching: 25 points per M if all holes needed in the sheet can be punched with one setting of heads and guides and at one lift; proportionately more for extra holes.

Stitching: Per M

Saddle		Side	
8 pages	160	64 pages	310
16 pages	175	128 pages	550
32 pages	200		

Bronzing: 20 to 40 points per 100, depending on size.

Hand Folding, per M:

	One fold	Two fold	Three fold	Four fold
9 x 12	15	25	35	45
11 x 17	20	30	40	50
17 x 22	33	44	55	66

These rates may be increased at the discretion of the teacher. Rates are low because work is easy.

Distribution:
Straight composition, one-fourth the setting rate.
Rule and display composition, one-fifth the setting rate. Odd jobs not listed, 50 points per hour.

PENALTIES

Composition:
Typographical errors on first proof.....2 points
Ditto on revise.....5 points
Poor justification.....per line, 5 points
Columns not lined up.....per line, 5 points
Use of wrong methods, contrary to instruction, or use of wrong materials, such as copper spaces in justifying, 5 to 25 points
Pieing cases by careless distribution.....50 to 100 points

Imposition:
Spilling type—composition rate plus.....5 points
Reversed quoins or other mistakes in arrangement.....5 points
Form out of square or not flat.....5 points

Presswork:
Not keeping accurate account of impressions.....10 points
Dirty hands.....10 points
Trying to use dirty press.....10 points
Each smudged copy.....1 point
Each copy not fed to guides.....1 point
Poor color.....5 points
Too much ink, offset.....10 points
Carelessness, such as putting in chase in reverse position, printing on pins or gripper, misuse of press.....10 to 50 points

Paper Cutting:
Miscutting paper—a number of points equal to the value of the paper in cents.
Letting motor run while arranging paper.....5 points

Makeready:
Wasting tympan paper.....5 points
Wrong procedure.....5 points
Wrong margins.....5 points
Poor impressions.....5 points
Misuse of press, carelessness, not following directions given.....5 to 25 points

Care of Shop and Equipment:
Failure to clean up working place.....5 points
Deliberate carelessness or misuse of equipment or shop, 10 to 25 points

Note that the mistakes in paper cutting and in press feeding carry a more severe penalty than other errors. This is because these operations are final and affect the product turned out to a greater extent than other operations which can be corrected.

The teacher must always be on the alert for necessary modifications of the scale, and should not hesitate to change any figure which does not suit the conditions of his shop. In general, however, most of the figures given work out very well in practice. Some of those given on the scale have been well tried out, while others will be less satisfactory. It is impossible for any scale to suit the conditions of every shop because of different equipment, different methods, and other factors.

Keeping the Records

The record system must be well planned. If care is exercised this work will not be a burden. The directions to pupils indicate the general method of keeping track of what each pupil does. That is, each pupil makes his own report and leaves a record of it on the teacher's spindle. The slight formality of having the foreman sign reports helps in creating an honest atmosphere and encourages the foremen to watch the progress of the work through the shop. Reports are handed in at the completion of a task assigned and most tasks

will take more than one period, so that there will be only about half as many reports to figure every night as there are pupils.

The composing room foreman hands in a report every day covering the condition of the composing room in order that fines may be levied against careless cleaning up. The pressroom foreman turns in a daily report covering the work done on the machines in his department, showing who worked on each machine, amount of work done on each, and condition of machines at close of period. Printed forms make this work easy. The foremen put away their individual jobs about five minutes before the other pupils in order to have the extra time needed.

At the close of the day the teacher goes over the reports on the spindle, looks over work, checks presswork, etc., and calculates the number of points due each pupil, writing it on the report itself. Next day the secretary spends about five minutes in entering these amounts on the pupil's individual printed record blanks. The record cards will look something like the accopanying illustration.

Fines may be written in as separate items or may be deducted from the number of points given on the quantity of work done. The former method gives more information to the teacher and seems preferable to the latter method.

Creston High School Print Shop

Point Record of..... Class..... Year.....

Job	Comp.	Imp.	M'rdy.	Press	Misc.		Total

After using the scale for a short time, the teacher will remember many of the rates and will not need to refer to it very frequently. Then, too, some of the jobs done will be repeated often enough so that the number of points given for them can be listed and save the need of figuring the credit over again. These little helps will make the use of the scale simpler, and I hope will encourage teachers to try the use of such a system of grading, for I feel sure that after a fair trial it will give more satisfaction to the teacher than other methods ordinarily used and will result in a decided improvement in the interest of pupils for printing.

HOUSEHOLD MECHANICS IN DETROIT

J. H. Trybom, Director, Vocational Education, Detroit Public Schools

Household Mechanics is the name given to a course of study in industrial arts, intended to enrich the courses in manual training. It is carried on in the seventh grade of the junior high schools, four 60-minute periods per week during one year.

The instruction is given in a General Shop which is provided with the following units of equipment, allowing for eight or more boys in each line of work:

(1) Electrical bench with outlets, together with some common electrical devices used in the home.
(2) Plumbing fixtures, including valves, flush tanks, etc.
(3) Sheet metal bench, with vises and sheet metal tools.
(4) Manual training wood working benches, equipped with common tools.
(5) Recitation seats, demonstrative bench, blackboard, individual lockers, etc.

The immediate aims of the course are (1) to develop intelligence, initiative and thinking power in connection with the care and repair of the mechanical devices and furniture, etc., of the modern home; (2) to provide the opportunity of using tools and materials and of planning and doing the various jobs involved.

This instruction is very popular with the boys, and the parents have shown great interest. Thousands of letters of appreciation have been received from them by the teachers. As there is a constant opportunity for applying the ability that the boys have acquired, this knowledge is not lost during the period intervening up to the time when the boys will need it in their own homes. Some of the typical jobs are: Sharpening of tools, shears, lawnmowers and saws, repair of leaking utensils, by soldering; mixing of putty, cutting glass, glazing, removing window sash, repairing window cord, hanging shades on rollers and repair; applying paint, varnish, and kalsomine; glue and furniture repair; refinishing furniture. Reading water meters, repair of leaking faucets, repacking valves, repair of flush tanks, cleaning of traps; repairing of small motor, adjusting air mixture in gas burners, renewing dry cells, rewiring bells and buzzers, locating blown fuses, cleaning of furnaces, etc.

As Detroit is generally given credit for originating and developing the household mechanics course for public schools, a brief outline of this process may be of interest.

To help to overcome the narrowness of the manual training instruction in the seventh and eighth grades of the elementary schools, the teachers of this subject in Detroit were urged at a meeting held in 1912 to introduce as supplementary to the woodwork some other line of constructive work suitable for boys of this age. This led to the introduction of sheet metal work in one shop, electrical work in another, lock repair, and furniture in others. In the meantime the needs of the children were studied at the monthly teachers' meetings. These discussions naturally led up to a study of the home and of such repairs of the household furnishings as boys of this age could profitably undertake.

A committee of teachers was formed in 1913 with the purpose of organizing the material thus evolved into a course of study covering one year or in all 40 lessons of 90 minutes each. This committee failed to accomplish its purpose, but much discussion resulted about the organization of such a course.

Another committee was appointed the following year with the same results. In the meantime some progress had been made in a few schools in developing short courses in sheet metal work, electrical work, lock repair, faucet repair, and furniture repairs. This work was carried on in the manual training shop as supplementary to the woodwork. A few individual teachers, as Frank I. Solar, L. H. Simpson, H. N. Eddy, Earl L. Bedell, and John E. Blair, had demonstrated that certain problems in sheet metal work, plumbing, lock and furniture repair, and electrical work were entirely practical and of considerable value for boys of the eighth grade.

Up to this point the teachers interested had undertaken only one new line of work each and there were no definite outlines except as the teachers prepared them for their own use.

The first successful attempt of organizing this material into a composite course of study was accomplished by the assistance of Earl L. Bedell, at that time an elementary teacher of manual training, who prepared a chart giving 100 jobs in household repair in 1917. On this chart the word "household mechanics" was used to designate this line of work. A few elementary manual training teachers applied this chart in their classes the same year.

In 1918 the McMichael intermediate school was opened with a room equipped for household mechanics and with Mr. Bedell as teacher. Courses for the training of teachers in household mechanics were begun in the spring of 1919 and a course of study was printed by the board of education at the same time. The teacher training courses have been repeated each year.

In 1919 ten elementary schools were especially equipped for complete work in household mechanics: Franklin, Garfield, Fairbanks, Lingemann, Ellis, Kennedy, Goldberg, Bishopa, and Majeske.

An additional twenty schools were equipped in 1920. In our eleven intermediate schools this course is now given in the seventh grade to all boys, four 60-minute periods per week for one year, and it is also given in all elementary schools that have eight grades, i.e., every boy in Detroit now receives instruction in household mechanics.

The Michigan State Board of Control for Vocational Education published in 1922 Bulletin No. 214 on Household Mechanics by Bedell and Trybom.

This new development in the industrial arts field for which our Detroit teachers, and Mr. Bedell in particular, deserve the credit, was initiated by myself and carried out under my direction.

A COURSE IN SHOP PROCESSES

R. E. Baker, Head of Machine Dept., Boston Trade School

(Conclusion)[1]

In a previous article we outlined the aims and purposes of the course, the contest of the first year's work, and our methods of teaching it. Let us now consider briefly the content of the second, third, and fourth year lessons, and show how we correlate classroom discussions with shop practice.

The charts shown outline briefly our shop course, listing the operation in the order best adapted to the equipment, and the products we manufacture. As previously stated, it cannot be arbitrarily or consecutively followed by each student, but each must satisfactorily complete the prescribed course during the year, to merit promotion or graduation.

We start the second year classroom discussion with a few lessons of review, renewing acquaintance with the different machines used, and the principal operations performed in the preceding year. Then, referring to the shop chart for the second year, we begin our advance study with "Operation No. 33 Lathe No. 12." The same methods of classroom instruction are adopted: First, getting acquainted with the machines or equipment involved, then discussing the operations and methods, and finally checking up by examinations and shop reports.

Five new types of shop equipment are introduced, namely: The planer, the turret lathe, the vertical milling machine, the forge, and the cylindrical grinding machine. To the machines already studied, special attachments and more complex operations are added. Planer work presents entirely new methods of holding stock to be machined, and we endeavor to impress every student with the importance of stresses and strains, and the necessity for uniformity in setting up. The turret lathe brings out the principle of rapid production. The vertical milling machine introduces more of end milling, and starts the students again in their questions as to the merits of different methods used to produce plane surfaces.

The forge and anvil work in the shop is quite elementary, but it furnishes splendid material for classroom discussion, and arouses interest in an important branch of stock treatment. Cylindrical grinding gives another opportunity to stress the accuracy and finish, and a very efficient method of attaining both.

In second year shop work students are doing work with similar results, but upon different machines than were used by them in their first year. As an example of this: Boring in the first year was done on the lathe, and with a single point cutting tool. In the second year, considerable boring is done on the drill press and the milling machine with a boring bar and pin cutters. We try to have the boys "think" on the job as to the respective merits of different methods, and in the classroom we adopt the "comparison" method of discussion.

In the first year we stress the "doing" of an operation correctly; in the second year we add to that the "why". Where it has seemed practical, students have ground and set up their own lathe and shaper cutting tools but it is reserved for the second year to study the theory. "What is the cutting angle? The clearance angles? The rake angles?" "How are these

PLANING IN KEYWAY AT THE BOSTON TRADE SCHOOL.

[1]The first article appeared in the Industrial Arts Magazine, November, 1925, page 406.

MACHINE DEPARTMENT

Chart No. 1—Shop Work for the First Year

Op. No. 1 Lathe No. 1	Centering cyl. work. Three methods.	Op. No. 9 Bench No. 1	Rough filing flat surfaces.	Op. No. 13 Drill No. 1	Sensitive drill. Simple templet.	Op. No. 18 Shaper No. 1	Planing faces and sides of block. Vise work.	Op. No. 22 Miller No. 1	Milling faces and sides of block. Vise work.
Op. No. 2 Lathe No. 2	Squaring end stock, on centers, in chuck.	Op. No. 10 Bench No. 2	Hand hack-sawing small stock.	Op. No. 14 Drill No. 2	Drill press. Vise work. Layout templet.	Op. No. 19 Shaper No. 2	Planing ends of block. Vise work.	Op. No. 23 Miller No. 2	Squaring end of block. Facing cutter.
Op. No. 3 Lathe No. 3	Straight turning scale dimensions.	Op. No. 11 Bench No. 3	Laying-out, drilling, hand tapping.	Op. No. 15 Drill No. 3	Simple table set-ups. Flat work.	Op. No. 20 Shaper No. 3	Planing tongue and recess.	Op. No. 24 Miller No. 3	Milling slots, tongues, recesses.
Op. No. 4 Lathe No. 4	Straight turning, right face, shouldering.	Op. No. 12 Bench No. 4	Laying-out, chamfer corners. Chip slots.	Op. No. 16 Drill No. 4	Drilling, tapping and reaming, on centers.	Op. No. 21 Shaper No. 4	Planing work set on angle.	Op. No. 25 Miller No. 4	Milling flats on work at an angle.
Op. No. 5 Lathe No. 5	Recessing, facing, cutting-off, R. & L. shoulders.			Op. No. 17 Drill No. 5	Drilling cyl. work, in vise.		LATHE (Continued)	Op. No. 26 Miller No. 5	Milling V's 60° and 90°.
Op. No. 6 Lathe No. 6	Taper turning tail-stock offset.					Op. No. 30 Lathe No. 9	Drilling universal chuck tail-stock.	Op. No. 27 Miller No. 6	Squaring cyl. stock. Rd. and Sq. shoulders.
Op. No. 7 Lathe No. 7	Taper turning compound rest.					Op. No. 31 Lathe No. 10	Chucking, boring, independent chuck.	Op. No. 28 Miller No. 7	Milling flats and slots. On centers.
Op. No. 8 Lathe No. 8	Thread cutting. V. & Stol. Threads.					Op. No. 32 Lathe No. 11	Chucking, boring, starting tap and reamer.	Op. No. 29 Miller No. 8	Milling squares and hexs. On centers.

Chart No. 2—Shop Work for the Second Year

Op. No. 33 Lathe No. 12	Chucking, facing, turning large disks.	Op. No. 38 Bench No. 5	Chipping, filing, keyways, oil grooves.	Op. No. 41 Drill No. 6	Drilling cyl. work in V blocks and special set-ups.	Op. No. 45 Shaper No. 5	Planing V's in block. Angle work.	Op. No. 49 Miller No. 9	End mill work. (In vise and on centers).
Op. No. 34 Lathe No. 13	Strapping, drilling, boring, on face plate.	Op. No. 39 Bench No. 6	Filing, fitting, (simple assembly).	Op. No. 42 Drill No. 7	Drilling, from templets and fixtures.	Op. No. 46 Shaper No. 6	Planing slots in cyl. stock, keyways.	Op. No. 50 Miller No. 10	Squaring cyl. stock, cutting slots (in V blocks).
Op. No. 35 Lathe No. 14	Taper turning with taper attachment.	Op. No. 40 Bench No. 7	Babbitting bearings.	Op. No. 43 Drill No. 8	Drilling, angle-iron set-ups.	Op. No. 47 Shaper No. 7	Slotting keyways in hubs.	Op. No. 51 Miller No. 11	Milling work, strapped to Angle iron.
Op. No. 36 Lathe No. 15	Boring with taper attach.			Op. No. 44 Drill No. 9	Boring, facing, counterboring with bars.	Op. No. 48 Shaper No. 8	Slotting large cored holes.	Op. No. 52 Miller No. 12	Cutting spur gears.
Op. No. 37 Lathe No. 16	Boring with compound rest.							Op. No. 53 Miller No. 13	Boring, facing, counterboring with bars.
		Op. No. 61 Heat Tr. No. 1	Forge work. Forming by hand, to fixture.			Op. No. 56 Planer No. 1	Planing block all over (Vise work).	Op. No. 54 Miller No. 14	Vertical machine. Flat work (Vise and table).
Op. No. 59 Turret No. 1	Turning, threading, tapping (Operate only).	Op. No. 62 Heat Tr. No. 2	Case hardening (cyanide).	Op. No. 63 Grind No. 1	Plain cylindrical grinding. (Roughing.)	Op. No. 57 Planer No. 2	Planing block all over (Platen work).	Op. No. 55 Miller No. 15	Vertical mch. slabbing squares, hex. (On centers).
Op. No. 60 Turret No. 2	Chucking, drilling, boring (Operate only).			Op. No. 64 Grind No. 2	Taper grinding. (Roughing.)	Op. No. 58 Planer No. 3	Planing block to fence and angle iron.		

Chart No. 3—Shop Work for the Third Year

Op. No. 65 Lathe No. 17	Turning, drilling, boring. Back-rest and chuck.	Op. No. 69 Bench No. 8	Scraping cylindrical bearings.	Op. No. 80 Grind No. 3	Cylindrical grinding (finish).	Op. No. 72 Shaper No. 9	Planing dovetails, T slots.	Op. No. 74 Miller No. 16	Vertical mch. T slots, dovetails, keyways. (On centers).
Op. No. 66 Lathe No. 18	Turning, drilling, boring, back-rest and face plate.	Op. No. 70 Bench No. 9	Scraping flat bearings.	Op. No. 81 Grind No. 4	Taper grinding. (Finish.)	Op. No. 73 Shaper No. 10	Planing racks.	Op. No. 75 Miller No. 17	Index head. Chuck work. Straddle milling.
Op. No. 67 Lathe No. 19	Turning, threading, follower, rest.	Op. No. 71 Bench No. 10	Repairs. General upkeep.	Op. No. 82 Grind No. 5	Shoulder grinding.			Op. No. 76 Miller No. 18	Form milling (special fixtures).
Op. No. 68 Lathe No. 20	Turning, boring, angle-iron on face plate.			Op. No. 83 Grind No. 6	Surface grinding.	Op. No. 78 Planer No. 4	Planing slots and T slots.	Op. No. 77 Miller No. 19	Vertical machine (circular attachment)
		Op. No. 84 Turret No. 3	Turning, threading, setting-up and starting.			Op. No. 79 Planer No. 5	Planing V's and dovetails.		
		Op. No. 85 Turret No. 4	Chucking, boring, setting-up and starting.						

Chart No. 4—Shop Work for the Fourth Year

Op. No. 97 Tool Making No. 1	Arbors, sleeves, collets.	Op. No. 91 Heat Tr. No. 3	Hardening carbon steel. (Reamers, cutters, etc.)	Op. No. 94 Grind No. 7	Steep angle grinding. Wheel base swivelled.	Op. No. 86 Planer No. 6	Planing (special set-ups).	Op. No. 87 Miller No. 20	Vertical mch. Boring, slotting (special setups).
Op. No. 98 Tool Making No. 2	Cutters, bars, end mills, reamers, counterbores.	Op. No. 92 Heat. Tr. No. 4	Tempering carbon steel.	Op. No. 95 Grind No. 8	Internal grinding (attachment).			Op. No. 88 Miller No. 21	Index head. Fluting taps, reamers, end mills.
Op. No. 99 Tool Making No. 3	Special drills, taps, dies.	Op. No. 93 Heat. Tr. No. 5	Hardening and tempering high speed steel.	Op. No. 96 Grind No. 9	Tool grinding. Reamers, cutters. end mills, etc.			Op. No. 89 Miller No. 22	Index head. Chuck work on angle (bevel gears).
Op. No. 100 Tool Making No. 4	Templets, jigs, fixtures.							Op. No. 90 Miller No. 23	Spiral milling. Cutters, gears.

TYPICAL CHUCKING JOB AT THE BOSTON TRADE SCHOOL.

angles determined and formed?" "What relation do these angles bear to the cutting efficiency of the tool?" These and similar questions are discussed, with the aid of models and blackboard sketches.

One of our aims is to stimulate interest in the larger aspects of the trade. When students are cutting gears on the milling machine, we devote some lessons to this method, supplementing them by a brief study of other commercial shop methods, namely: By automatic gear cutting machine, the gear shaper, and the hobbing machine. Boring is done in our shops on the lathe, drill press, and milling machine, and to our discussion of methods we add a brief study of the boring mill, and the horizontal and vertical turret lathes. Assignments for outside reading in catalogs and reference books prove helpful in stimulating interest in these other methods.

Shop experiences have impressed students with marked differences in the appearance and structure of metals which they have used or have seen machined. On some jobs the metal is turned dry, on others there is a steady flow of cutting compound or lard oil; some metals are being turned at one speed, some at a faster speed; at the furnace a piece of metal is being heated red hot, and then plunged into a tank of cold water or oil. For a few lesson periods we study briefly the sources of supply, the different processes for producing material, from the source to the machine shop, the special physical properties, the general uses for, and the usual methods of machining the commonly used metals in the trade.

In machining castings it is noted that some are simple in shape, and of regular surface; others are very irregular in shape with rough cored holes. This is especially true of chucking and boring jobs. Boys will note that the tools spring away more in some places than in others, that their measurements are not uniform on the first roughing cut, and that it is taking longer to produce the desired results than it has done on bar stock. A few lessons here, taking up briefly the work of the pattern maker and the foundry man, seem timely and worth while.

Simple block patterns and a box of sand will serve to illustrate the elements of pattern making, and the simple processes employed by the molder. Then patterns of a more complex nature, together with core boxes, will show why castings come to the machinist as they do with draft, fins, and irregular and oftentimes incorrectly placed holes. This study furnishes splendid opportunity to drive home the importance of "thinking out" or "sizing up" the material and job before a start is made to lay out, set up, and machine it.

After the review, the classroom assignments in the third year start with instruction of Operation No. 65 (Chart No. 3). During this year the shop work becomes largely individual in character, and the operations as listed are not followed as closely as in the preceding years. The class discussions follow the prescribed course, however, except where it is deemed advisable to study some operation which may be done differently in a large shop, or some phase of a closely allied trade contributing particularly to our own.

The surface grinder is the only new machine with which to become familiar, but there are several special attachments on the machines to claim attention. The processes of scraping in cylindrical and flat bearings serves to emphasize the necessity for accuracy, and the importance of hand skill, as well as machine operating efficiency. The study of the grinding machine and the turret lathe is continued with emphasis upon the setting up, tooling, and finishing operations. As castings to be machined are larger especially in planer work, we stress laying out work, the use of bridges, and the striking of center lines. As finished products calling for more accurate measurements, we devote a few lessons to the study of vernier calipers, height gages, gage blocks, special gages, protractors, and their respective uses.

A feature which is an important part of the course is the visit of third and fourth-year groups to large manufacturing plants. The departments visited include the pattern shop, foundry and core making rooms, the general forge and drop forging shops, the machine shop, and the tool and die-making departments. Previous to these visits the instructor outlines in general what he wishes the boys to inspect. Questionnaires are supplied to each student, who is required to make a written report of the trip. Subsequent class sessions afford a chance for asking questions, and for free discussion of comparative methods noted. The writer has found these trips very helpful. To be sure, the boys may not grasp the full importance of such a trip, but in most cases it stimulates interest, and a desire to progress toward a better class of work in the trade.

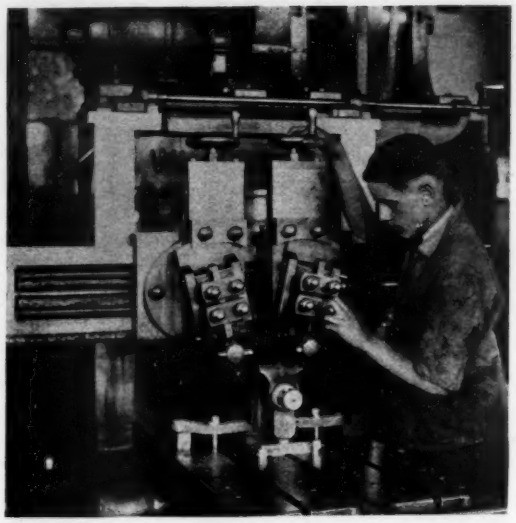
A METHOD OF SLABBING AT THE BOSTON TRADE SCHOOL.

You will note that in the fourth year shop course, there are no further operations listed under the lathe, drill press, and shaper. That merely indicates, however, that the fundamentals of these machines have been taken up in preceding years. The fourth year boys still use these machines, but incidental to produce better types of work. Chart No. 4 suggests the subject matter for class discussion. The "formal" lessons introduce as new equipment the tool and cutter grinder, the internal grinding attachment, special planer fixtures and setups, and the heat treating equipment. As new subjects for discussion we list: Worm and bevel gearing, fluting and spiral milling, internal grinding, lapping, special assembly work, and simple tool making, as it relates to the forming, heat-treating and grinding of cutting tools, and the design and making of simple templets, jigs, and fixtures.

As the shop work is largely of a special character, so many of the lesson periods are reserved for special discussions. Boys have studied and executed the general processes; now for a general review and the "why". A special feature of this year's work is the study of "routing" and "tooling up" a job. When a new job involving the use of many machines and bench work, is to be started, the fourth year class is supplied with blue prints and perhaps with some of the larger castings, and after some general remarks each boy is instructed to write out his ideas for routing the job through, and to submit sketches of special tools or fixtures which could be used in our shops. Each would study the problem in its entirety, but would "tool up" for one principal part only. To be sure the suggestions offered will have to be modified by the better judgment and experience of the shop instructors, but the boys are made to feel that they are having a share in the "planning" work of the department.

During the third and fourth years the reference book most generally used is the American Machinists' Handbook. This book is also used as reference in the drawing room and the mathematics course. By constantly referring to its pages of valuable trade information, we hope students will become acquainted with its data and formulas, so that they will make intelligent use of it when they get into the trade.

This, in brief, is our outline of a course of class study which we feel is closely related to trade processes. The correlation of the two is of necessity subject to our actual operating conditions in the shop, and is governed by accepted principles of good teaching, but insofar as we are able to do so we follow the lesson outline with this close correlation in mind.



ANOTHER METHOD OF SLABBING AT BOSTON TRADE SCHOOL.

But to get back to the introductory question which suggested these articles, "Well, what good is that subject, anyway?" We do not predict for each student the same rapid progress as told of the fruit vender. In fact, we try to impress it upon every boy that his school work is merely a start. He must get into the shop to learn the trade; he must continue to study on the job; he must practice habits of industry and honesty, and show a willingness to work hard. We do think, however, that this subject will stimulate a larger interest in the trade, it will help to teach boys to think, it will show them the importance of training their brain with training of their hand. It will help to make better workmen and better men. That is our aim. And if this subject helps us to attain this aim, we feel that it is worth while.

WHAT'S WRONG WITH THE BATTERY?

Ray F. Kuns, Cincinnati, Ohio

BATTERIES, LIKE FOLKS, all come to the end of their days, some sooner and some later. If a man's allotted years number three score and ten it might be said that the allotment of time for batteries to run their cycle of service would likely be around a score of months, possibly the average would be a bit better. Of course the natural life of some batteries is much greater than the indicated figure. Some batteries live to a ripe old age of three or four years, and occasionally one is found five years and more old going along fine. The number, relatively, however is small, just as the number of people who reach a hundred is relatively insignificant. They are the exceptions rather than the rule.

Again we have many batteries which "die young". Just as some people are born with inherited defects, and, their chances for a long life span lessened, so are batteries subject to inherent defects in their making and their lives are materially shortened because of them. Many batteries have their lives shortened by accidents. They suffer physical damage. Other batteries have their period of usefulness shortened because they are poisoned, just as people are poisoned, by partaking of something or other which their system can not use. Another point, in the life of the battery, analogous of the life of a person is the fact that troubles can be cured, operations may be performed, and life extended for further periods of service.

Outward Evidences of Physical Disintegration.—The old style wood case is being supplanted by the monobloc or one piece rubber case. This new case is not subject to quite the same type of trouble as the wood cases are. The rubber case must be handled carefully, especially when mounting it in the carrier on the car. If care is not used the ends of the case will be sprung outward when the hold-down bolts are tightened, and then leaks will develop so that the electrolyte may be splashed from the cell and cause the corrosion of the surrounding parts.

The wood case shown at the left in Fig. 1 has served a long life of usefulness as batteries go. The evidences of its age are upon it. Its trouble is that the protective painting was not properly done and the handling of the electrolyte was performed in a careless manner. The electrolyte after being carelessly spilled about the case quickly found its way down into the fiber of the wood, along the handle mounting holes. The result was that the battery was left without a case although it still functioned properly.

Watering and Testing Batteries.—When making a hydrometer test the workman may carelessly, or even accidentally, spill some of the electrolyte about the top of the battery. This should be avoided where possible; where it is not preventable the spilled electrolyte should be removed with a rag, dampened in water and then the action of the acid further retarded by means of a treatment (washing) with baking soda. This should always be available for neutralizing any acid spilled about the car, or about the floor or bench of the shop, as well as over the batteries themselves. Always keep the top of the battery dry.

Paint.—Asphaltum paint is used in painting the battery case before putting the battery together. If the battery paint which is acid resisting is used to repaint the battery occasionally its life may be materially lengthened.

FIG. 1. WORN OUT WOOD CASES MUST BE REPLACED.

Cell Jar Troubles.—The cell jars of the old type, appearing in the illustrations, Figs. 1 and 2, are made of hard rubber. These jars are moulded. They sometimes are imperfect when turned out from the factory. Factories take many precautions against the use of the imperfect jars. However, it is possible that a jar may test all right at the time it is made and then later develop some very tiny holes and leak out the electrolyte. This is a very serious condition and results in the destruction of the wood case due to the fact that the electrolyte attacks it from the inside where the workman cannot see it or get at it. Where this condition exists the best indication is the fact that one cell of the battery continually needs to have the water replenished while the other cells require it only occasionally. The same condition exists when a cell jar is cracked. Cell jars may be made with tiny cracks but these are usually found before the cell is put into a battery. The more usual thing is for the cell jar to be broken due to rough handling, as when the battery is dropped, left loose in the battery carrier on the car, or otherwise misused. The battery may be overheated, or it may be frozen. In either event internal strains will be set up and the jar may be forced and cracked. Two cells which were the victims of rough usage are to be seen in Fig. 2. The one at the left had a tiny crack, found after much difficulty, and enlarged for the sake of the illustration. The other had the piece cracked and broken from it while the workman was attempting to pull it. When working with cell jars they should be softened by heating, before installing or removing them, or when installing the elements in them. Heating may

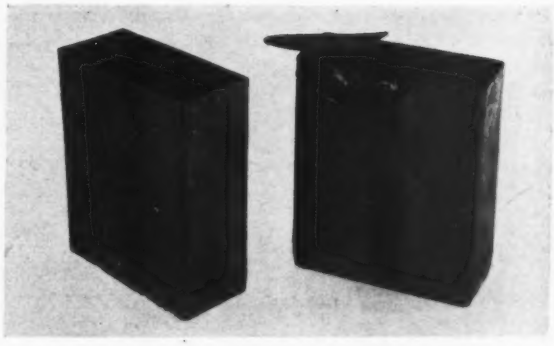


FIG. 2. CELL JARS ARE SUBJECT TO DAMAGE FROM CARELESS HANDLING.

be by means of hot water poured in and allowed to remain for a few minutes, or the slow-heating gas flame may be used. The water method is more uniform.

Using Old Cell Jars.—Old cell jars may be cleaned and used again. In Fig. 1 the old worn case is to be replaced by the new case at the left. The cell jars are in good condition except for some sediment in the bottom of them. This sediment should be flushed out with hot water at the hydrant. A small length of hose on the faucet will be handy for this work.

Mud.—Battery mud is a collection of active material, often found between the cross ribs or bridges at the bottom of a cell jar after the battery has been in use for some months. In use the battery wears away due to the electro-chemical action within the active material. The fine particles of this natural wear find their way to the bottom of the cell jars and there accumulate. That is the reason for having the ribs in the bottom of the jar on which to mount the plates and separators. If the mud comes to the point where the bottom of the plates rest, a short will result and the battery will need to be rebuilt, or discarded. Whenever the plates have shed to that amount, however, the battery will need new plates.

FIG. 3. A CELL JAR CUT AWAY TO SHOW COLLECTION OF BATTERY "MUD" BETWEEN THE RIBS OR HINGES.

A hack saw was used to saw off the side of the cell jar shown in Fig. 3 so as to expose the mud to view. This picture shows the mud up to and a bit over the tops of the ribs. This

FIG. 4. THE WHITE DEPOSIT ON THESE PLATES WAS CAUSED BY ALLOWING THE BATTERY TO BECOME DISCHARGED AND STAND IN THAT CONDITION.

was the reason for the failure of the battery. This battery simply died of old age.

When rebuilding batteries it is best to make certain that none of the mud remains. It is unethical to leave it. The owner of the battery has a right to expect it to be removed.

Sulphation.—There are two kinds of sulphation. The first is the natural sulphation which does no harm. The electro-chemical action of the battery depends on this natural sulphation. Sulphation is the sulphur of the sulphuric acid leaving the electrolyte and is deposited on or in the plates. Whenever a battery discharges, this sulphation takes place. When it is recharged it is driven out or off as the case may be. This is the normal battery action and the sulphation does not leave the plates hard and worthless.

Abnormal sulphation does just that. The plates become hardened and nonporous. They become inactive. The causes of this trouble is discharge beyond a reasonable point and allowing the battery to stand for a great length of time without recharging; also allowing the water level to get too low repeatedly and allowing it to remain at a low level. Note Fig. 4.

Removing Sulphation.—Sulphation is removed by reversing the process of its formation. It is formed by a long continued discharge. If the battery is recharged at a slow rate, over a long time, it will be brought back to fair activity, granting of course that the trouble is not of too long standing. Sometimes it is necessary to continue the charge for several days, at a very low rate, before getting the battery to a point where the hydrometer reading shows any charge whatever.

Pitch in the Cells.—It frequently happens that the workman in a factory or a repair shop will not have perfectly fitting parts when sealing the cell covers to the cell jars. The result is that when pitch or sealing compound is run into the crevice to seal the job, the pitch runs down onto the top of the plates. In itself the pitch does no harm, unless it works down between the plates and separators, or similar places. In this instance the damage is a physical one. The pitch has no electrical or chemical action but the little balls may wreck the separators physically by working holes into them. In this case a short circuit is set up and the cell discharged. The practice is to use asbestos wicking and pack the crevice where the pitch may get through to the inside. Again this is a matter of pride of workmanship or a matter of ethics.

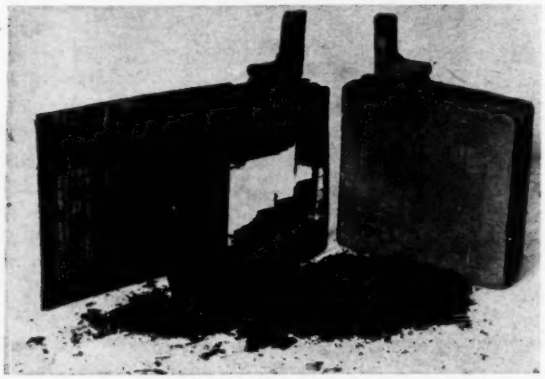


FIG. 5. BATTERIES WEAR OUT AS THEY GROW OLD. THE PLATES MAY FALL TO PIECES WHEN THE ELEMENT IS WITHDRAWN FROM THE CELL.

Old Age.—The top view in Fig. 5 shows an element pulled from a battery which was 3½ years old. The negatives were still holding their form. The separators were in fairly good condition, but the original positive plates were through. Their grids were cracked and the active material was falling from them. The plates were so far gone that it was impossible to hold them together for a photo. The active material and much of the grid stock of the positive group is laying on the board as it fell.

Plates frequently go to pieces in this manner. It is not always an indication of old age; it may mean that the battery has been used very hard and has not received the best of care. It may also mean that the formula under which the plates are prepared was not followed exactly and the grid did not stand up properly. In this case there was no fault whatever to find. It simply wore out like "the one horse shay."

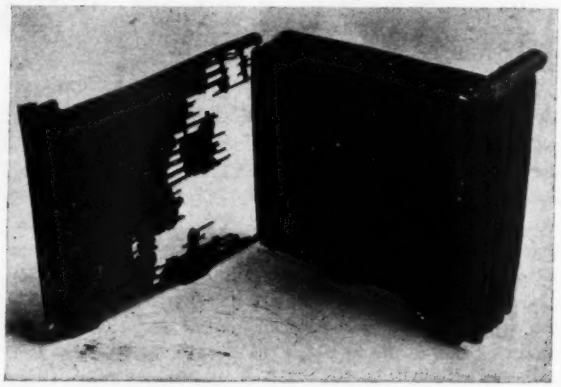


FIG. 6. PLATES WILL SHED ACTIVE MATERIAL IF BADLY OVERHEATED. THE BATTERY SHOULD NOT BE ALLOWED TO HEAT BEYOND 115° FAHRENHEIT.

Overheated Plates.—When batteries are recharged they may be overheated. This may happen on the car where the battery is charged continuously on long trips. This is more likely to happen where the battery is inclosed in a container and can get no ventilation. When plates are overheated the active material will fall from the grids and these may appear to be left in fairly good condition. The plates shown in the center section of Fig. 6 were overheated and they were fairly old. They would have given some months of service except for the overheating.

Warped Plates.—When plates are overheated, or when they are charged too rapidly, or discharged at too great a rate over a long time they will buckle. This means they will warp out of shape. It may be nothing more than a warping

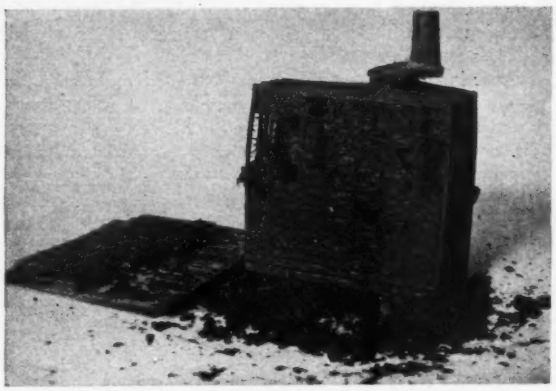


FIG. 7. WHEN PLATES ARE FROZEN, THE ACTIVE MATERIAL FALLS FROM THEM.

of the edges as shown in the edges of the overheated group in Fig. 6, or it may mean that the active material will expand and bulge the plate in all directions and the cell jars likewise. Naturally under these conditions the plate will go in any direction, particularly where there is least resistance. The plates become malformed and the grids buckled and cracked.

Frozen Plates.—When a battery is allowed to become discharged and then allowed to stand in a cold place with the temperature below freezing, the result will be that the water within the cells freezes, the plates likewise freeze and the battery is ruined. Batteries which are even a quarter charged are not subject to this trouble in any average winter, but each winter much money is spent which might be saved if the batteries were kept charged.

The results of freezing are evident in Fig. 7. This battery was rebuilt, then run down on a cold engine which refused to start. The car was allowed to stand outside and a few days later the battery came into the shop. It will be noted that the active material has been frozen and particles of it are sticking to the separators. The merest touch caused the active material to fall from the grids in chunks. Frozen plates are worthless. Besides the plates the cells are usually damaged in a freeze.

Damaged Separators.—The merest defect in a separator will cause a shorted cell. See that the rebuilt batteries always contain new separators properly installed. A separator cracked or punctured will not do. Separators will wear out quickly if the element is too small for the cell jar and is allowed to have space for any movement. This is due to the vibration of the heavy plates against the separators, the vibration being transmitted from the road and the engine. Always replace old separators with new of proper size and fit.

What About the Old Plate Which Looks Good?—Experience is the best teacher here. If the plates appear good and the battery has been dismantled for some trouble, other than plates, it is doubtless worth while to reinsulate and rebuild with the old plates.

As a rule, the positive plates wear out first and they are discarded and new positives assembled with the old negatives. However, if the negatives next fail, it will not pay to put in new negatives against old positives, except as a makeshift. One set of negative plates will generally wear out the second set of positives. Sometimes the plates appear all right but fail. Lack of capacity is the trouble. The cadmium test will show up this trouble.

The value of the positive material is tested with a knife point. If it is fairly hard and most of it is in place in the grid, the plate may be used again. The negative plates sulphate most and these require a slow charge to put them in condition.

Defective Lead Castings.—Not infrequently a battery fault will develop due to bad alloying of the lead. Antimony is used to give the lead grid strength. If too much is used the grid will become too hard. Other castings, as for instance the plate straps, the pillar posts, and connectors will sometimes crack and break under strain. These breaks are hard to locate if they are within the battery cells. For instance, one plate may break off from the group, or two or three of the group may be broken. The cell may show voltage but it will have no capacity. It needs to be opened up and repaired. The plates must be replaced if the trouble is of long standing.

Bad Welding.—When the lead parts are burned together it not infrequently happens that the lead welds are imperfect. This may be due to speed, foreign materials, or bad lead-stick material. If the trouble is within the cell-connector-to-post joint it is hard to find. It goes along pretty well until corrosion sets in, and it suddenly refuses to function. These may be tested with a pair of pliers and when found the remedy is reburning.

LOS ANGELES TO HAVE LARGEST VOCATIONAL INSTITUTION

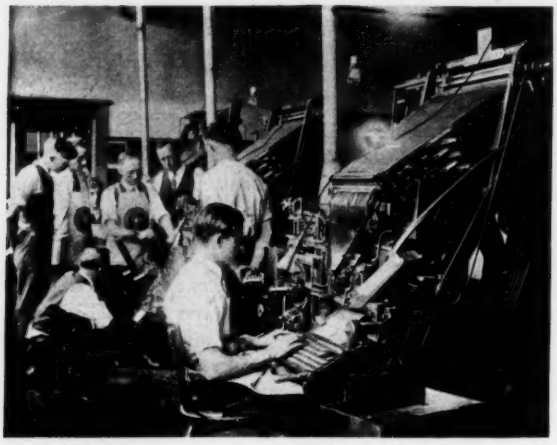
Frank Wiggins Trade School Will Accommodate 7,500 Students

With the opening in February of the new Frank Wiggins Trade School, to replace the present out-of-date building at Eighth and Grand Avenue, Los Angeles, Calif., will have the distinction of being the home of the largest and most completely equipped free trade school in the United States—if not in the world.

The new institution will care for 7,500 students daily who will be taught in three shifts of 2,500 students in each shift. The shifts will be from 8 A. M. to 12 noon, 1 P. M. to 5 P. M., and from 6 P. M. to 10 P. M., while 100 instructors will handle this vast body, including teachers of practically all the industrial trades.

The development of the vocational education program in Los Angeles has gone forward with remarkable rapidity since the passage of the Federal Smith-Hughes Act. The program up to 1925 was developed in the regular high and junior high schools of the city and in the Part-Time High School. In 1924-1925 a special state and federal subsidy was granted to the Los Angeles city schools for the maintenance of 55 full-time classes and 132 part-time vocational classes, and these were conducted at the following schools: Central Junior High, Gardena High, Hollenbeck Junior High, Hollywood High, Jefferson High, La Fayette High, Lincoln, Owensmouth, Polytechnic, Roosevelt, San Pedro, and Part-Time High.

The total amount of State and Federal funds apportioned to Los Angeles city for the maintenance of these classes was $51,393.30, representing about one-sixth of the total allowance



LINOTYPE INSTRUCTION IN THE PRINTING TRADES DEPARTMENT AT THE FRANK WIGGINS TRADE SCHOOL, LOS ANGELES, CALIF.

for vocational subsidy for the entire state which totaled $317,352.22.

During the school year of 1925-1926 the Frank Wiggins Trade School has been operating as a public trade high school of the Los Angeles School district. During this period there has been a tremendous demand for enrollment which is steadily growing. Over ten thousand have applied for information relative to the training offered. Instruction has actually been given to 1,535 in the day classes and 2,342 in the evening classes, making a grand total of 3,877 persons who have been served by the school during the year. Most of these people have received either promotion or placement due to their increased efficiency and their actual value to the community greatly increased.

The building is a height-limit (Los Angeles does not permit construction of buildings higher than 150 feet), Class "A," reinforced concrete structure of eleven stories, and represents an investment of $750,000. It is the central unit of a proposed $1,250,000 building, was designed by Architects John C. Austin and Frederic M. Ashley, and includes many modern features throughout its eleven stories.

A store, modern in all its appointments, will occupy one corner on the first floor. This store, in addition to providing the students with supplies, will market the products of the school, and there will be offered to the public such articles as furniture, millinery, garments, works of art, electric appliances, and many other useful articles.

The administrative offices will occupy the central portion of the main floor and will include, in addition to the space provided for the principal's and vice-principal's office, room for an employment bureau, registration office, business office, information desk, telephone exchange, vocational clinic, special supervisors and department heads.

Other interesting features throughout the building include a garage open to the public, two complete four-room apartments to be used by the interior decoration classes, a two-story frame house for practice work in plumbing, a completely equipped food department with provision for training chefs and stewards, and a complete radio system with loud speakers throughout the building and a broadcasting station on the roof. Motor ramps which go to the first and second floors are provided for and fast elevators, each capable of carrying an entire class, will move the students from one floor to another.

In a recent article, Mr. Robert A. Odell, President of the Board of Education, Los Angeles Public Schools, stated:

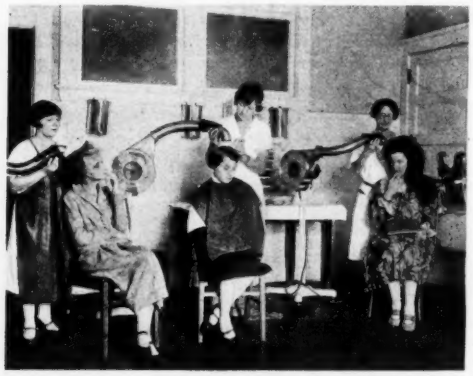
"The new school will represent the first capital outlay in this project, as heretofore the trade school and the classes from which it developed have been conducted in rented quarters. Inclusive of the first unit now under construction the capital outlay will be substantially as follows: Land, $114,000; appropriation for the building, $730,000; equipment for same, $300,000; a total of $1,144,000. Additional needs will no doubt develop as the building nears completion, which will require additional appropriations. Inasmuch as the site

H. A. CAMPION,
Principal of the Frank Wiggins Trade School, Los Angeles, Calif.

was purchased from the elementary district, the funds employed in the purchase passed to that district and the Los Angeles school system still has the benefit thereof. It should be stated, however, that since the elementary district thereby parted with the ownership of the land, the funds will be needed for elementary district purposes.

"For the day school, during the year 1925-26, the cost of instruction, maintenance and operation amounted to $74,275.63, which equals $161.82 per capita cost, the average daily attendance being 459. For the evening school during the same period, the total cost was $19,596.98, which equals $83.04 per capita cost, the average daily attendance being 236. This difference is explained by the fact that the evening school is conducted on a half-time basis.

"While the operating expenses and cost per capita, as shown above, seem very reasonable, it is only fair to assume that these costs will be increased as more extensive work is undertaken and when the school moves into the new building, there will be a larger staff of instructors and department heads."



CLASS IN HAIR DRESSING IN THE BEAUTY CULTURE DEPARTMENT AT THE FRANK WIGGINS TRADE SCHOOL, LOS ANGELES, CALIF.

FRANK WIGGINS TRADE SCHOOL, LOS ANGELES, CALIF.

In a more detailed description, Principal Campion stated that in addition to the new machinery, which will be the most modern, approximately $50,000 worth of trade equipment will be donated by Los Angeles concerns who have volunteered assistance in outfitting the school. The largest expenditure for any single department will be that of the printing trades, which will be close to $39,000. This will include linotype machines, monotype apparatus, and about a dozen presses ranging from the small platen press to the large automatic cylinder type.

The sum of $26,000 will be expended for woodworking machinery. One complete floor will be devoted to instruction in the woodworking trades, which includes equipment for cabinet making, mill work, carpentry and pattern making, and a completely outfitted carpentry shop. Motor trucks will be provided to transport an entire class from the school to the building being erected. These trucks will be equipped with woodworking machinery and instructional facilities and constitute a traveling carpenter shop and classroom.

Forty-five thousand square feet of floor space have been given over to the automotive industries department. The entire main floor, except that portion set aside for the administrative offices, will be used as a general garage. This huge garage will be under the direct supervision of the most expert instructors and garage managers.

Among the other departments requiring large expenditures will be a mechanical laboratory, complete with devices for testing iron, rubber, glass, and other materials, for which $8,600 will be required. For the electrical department, $8,500; drafting trades unit, $4,000; cafeteria and cooking department, $10,000; beauty culture and personal hygiene, $5,600; and $18,000 for office furniture, fixtures, and steel lockers.

The remaining portion of the equipment fund will be used for brick-laying, plastering plumbing, sheet metal, tile setting, welding, interior decoration, blue printing, sign painting, and other departments of the school, the curriculum of which will include the following: Alteration of ready-to-wear garments, automobile construction, operation and repair, painting, electricity, nursing, first aid, plumbing, beauty culture, plastering, bricklaying, cafeteria management, cooking, dressmaking, paper hanging, decorative arts, costume designing, furniture making, mechanical, architectural and marine drafting, linotype and monotype operation, platen press work, proofreading, editing and applied journalism, radio operation and construction, show card writing, steam engineering, telegraphy, power machine operation, wireless operation, tea room management, candy making, and cleaning and dyeing.

The following is quoted from a circular recently published in Los Angeles: "The training program of the Frank Wiggins Trade School is not measured by terms, semesters or years, but is evaluated solely upon the accomplishment of the individual. Graduation does not come at the end of a given period of time, but a certificate of completion is given to the person whenever he has accomplished successfully the work of a particular training program; for a period of six months after his leaving school he is carefully followed up and if he is able to 'carry on' efficiently in the actual work of the trade, he is then granted a Certificate of Proficiency. Accomplishment alone is the measure of a student's progress."

THE TEACHER'S RESPONSIBILITY

We believe the teacher is responsible for seeing that every avenue to a child's soul is open and in continual use; that as far as possible the day is filled with delightful work, hard work, worth-while work; that in his early years the child has opportunity to paint, draw, model, cook, sing, sew, and dance, to construct, read, write, and that he gains some measure of control over the fundamental tools of civilization—some experience in its great occupations and arts which have brought mankind to the present level of society; and finally that the teacher is responsible for seeing that the children's expression and effort result in satisfying achievement.—*Flora J. Cook, Chicago.*

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn

Editors

VIVID COMPARISON

A method of impressing effects in design which might be more generally adopted to great advantage has been introduced by Henry Turner Bailey, Director of The Cleveland School of Art.

Short convocations are held by the students of the Cleveland School under Mr. Bailey's direction, at which two projections are thrown on the screen at the same time. One shows a good example of a particular historical style in the applied arts, and the other shows the attempt of the modern designer to adapt this style to some local object such as building, monument, or museum specimen.

With this evidence of past and present before the students, comparisons are drawn in the way of effect produced and interests represented.

To the student who has learned to recognize types of design, our American communities offer examples in considerable variety because our designers have been busy for years adapting historical style to modern buildings and appliances.

These adaptations are not always appropriately or well made but the error as well as the success of such adaptation has educational value.

Art at best is the expression of the civilization that produces it but it is no more possible for the designer to devise independently of the past than it is possible for the individual to live independent of heritage and tradition.

Just as interest in botany is developed by the recognition and comparison of natural forms, so may interest in design be developed by the comparison of past with present examples of design.

Here is the introductory statement of a report submitted to the teacher of a public school on the study of a building which stands on the campus of the school:

"It seems to me that the most important thing that education does is to increase one's appreciation of his surroundings.

"The old library was to me simply a building, old and dirty, until I studied it and discovered for myself its endless interrelations of design."

This particular building was built in a style known as American Romanesque which is not uncommon in our American communities. Each community offers some examples of adapted historical style or elements of style that are reflections of the past.

This student had been led to discover "for himself" the interests of a medieval style and had become informed of interests which will be of decided value to him.

He would not have done this without the vivid example of the old library. We may well follow Mr. Bailey's example and use the material at hand to vitalize our instruction in design.

ART AND FINANCE

Art as a national asset is peculiar in reaction. We are informed by a news item from Paris that Marshal Joffre's "save the franc fund" campaign is to be generously supported by the sale of valuable works of art contributed by the artists of forty nations who, having been trained in Paris, realize their obligations to France.

The Latin temperament is sometimes held responsible for the deplorable financial condition of France; now this same temperament appears as a considerable financial asset. Without art, France would be bankrupt indeed.

National investment in art brings slow returns but they are certain and permanent. Otto Kahn's statement that "looked at from even a business standpoint it pays to support art," is verified by the imperishable art wealth of Europe.

Hamilton W. Mabie calls attention to the debt nations owe their artists as commercial assets in his review of "Thackeray's London," by F. Hopkinson Smith. He says: "If you wish to make a house or a locality a shrine, to which pilgrims will come long after the makers of fortune have been forgotten and their wealth divided and wasted, get a man who deals with ideas to live in it or to write about or paint it. The great artist has immense commercial value to everybody but himself."

THE NEW YEAR AND OPPORTUNITY

Observation of the past leads to the conclusion that there is little that is new or unprecedented excepting opportunity.

We are reminded of that old classical epigram in which a mythical statue by Lysippus converses with an inquisitive mortal.

What art thou? asks the mortal.

Opportunity which masters all things, replies the statue.

Why dost thou stand on tiptoe?

I am always running.

Why double wings on thy feet?

To fly the air.

Why this sharp knife?

To show mortals that I am keener than any point.

And thy locks, why do they fall over thine eyes?

By Zeus! It is by mine hair that I must be seized in the struggle.

And behind, why art thou bald?

He whom I have once outstripped may not catch me from behind.

EDUCATIONAL MUSEUMS

Whatever may be said of the lack of broad training on the part of our prospective artists in the schools of art, it is evident that there is developing a valuable cooperation between the great museums and the public schools of their communities.

We have before us the Educational Number of the Bulletin of The Metropolitan Museum of Art.

The cover is highly significant. It is by Elizabeth Shippen Green Elliott and represents the medieval knight and lady of romance stepping out from a tapestry castle park to greet the school children of our own time with polite and kindly confidence.

Books, however well written; illustrated lectures, however well delivered; classroom instruction, however well conducted, cannot quite give the valuable impression of the actual work of those who have lived, loved, and worked in other worlds and times.

Of course, these beautiful things must be more than explained and exhibited. The art of the past must be made to verify and vivify the romance of our own time. The incentives which led to the production of fine art exist in the heart and mind of the school child of today. The painstaking care; the unselfish motive; the romantic spirit of the master craftsman is evident in his work. This evidence must not only be impressed as a thing of the past but must be carried over and applied to the life of today.

Our museums are becoming a great and effective educational asset.

WORK YET TO BE DONE FOR EQUALITY OF OPPORTUNITY

From the discussions that are going the rounds and the echoes from various educational conventions, it is still evident that not everything has been said and done in the matter of objectives in the field of practical education. There are still places where the old-fashioned manual training is going on in the fervent hope that it may make its contribution to the pressing educational problems of the day. There are still administrators who are not willing to concede industrial arts and vocational work a place in the curriculum. There are cities and towns in which the whole problem of the training, employment, supervision, and guidance of the youthful workers in industry is not considered in any sense a part of the business of the public schools. Such problems are still left in all too many localities to the caprice, the accident, the whim, or the economic stress of the individual and the demand of industry.

Let it be said again that there can be no real claim to democracy in this country until equal opportunity faces all children. When we see the enormous expenditure and the complicated systems and agencies for the benefit of those who are fortunate enough to go through high school and on to college, and by comparison the niggardly treatment of those who desire or must go to work early, we are impressed with the fact that there is much yet to be done in this country before equal opportunity gets within knocking distance of a million doors.

We know of no reason why the shoe cobbler, the dressmaker, the carpenter, or the auto mechanic may not have a right to demand the same assistance from the public schools for his life work as is provided at public expense for the lawyer, doctor, or architect. Progress is, of course, being made along these lines. And we are sometimes led to believe proper provision has already been made for all our children. Then we suddenly realize that such is the case only in favored communities where wise, far-seeing educators, business men, and industrial executives have cooperated to bring the needed assistance and relief.

The agitation and education must continue. It is not enough to be satisfied with a local solution. The values of such work must be presented to neighboring communities and the need and the possibilities of a system to offer and maintain that equality of opportunity guaranteed by the Great Declaration, must continue to be emphasized.

THE OLD YEAR AND THE NEW

Another year has passed. It has been a remarkable year in many ways. In international relationships, some progress has been made toward better understanding and more sympathetic dealings, notwithstanding the fact the whole situation is far less reassuring than was hoped for at the close of the war.

America has prospered and in her prosperity, she has sometimes lost sight of the finer, richer, and more significant values of life. Work has been plentiful, wages have been good, business has been satisfactory, we have been singularly free from industrial disturbances, and many forward looking movements have been inaugurated for the betterment of working conditions and the working man. And yet, crime has been rampant, disregard for law and the better things of life has sometimes seemed on the rapid increase. Social, economic, and moral philosophers seem at a loss to explain the situation. They are turning to every conceivable pretext, but they do not get at the root of the matter.

In the educational field, substantial progress has been made. Commendable activity has been noticeable in school building programs. The tendency toward retrenchment and economy has in the main stimulated wise and thoughtful consideration and re-evaluation of many of the problems of building, expansion, and curriculum reorganization. Some retrenchment measures have been decidedly advantageous. The problem of providing the elements of education for *all children* has come somewhat to the fore rather than the necessity of providing special forms of education for any one group. Such a movement was due, in the natural course of events. Perhaps never before has there been so nearly a unified effort in education and so nearly a common agreement as to the essentials of education and the methods of dealing with them.

Here we are at the opening of a New Year. Favorable signs are observable on every hand. There are really no violently revolutionary nor reactionary movements in sight. The ground is cleared for the greatest progress and achievement in the history of our educational system. Every teacher should go forward with a new zeal and a new hope. And the best wishes of the INDUSTRIAL ARTS MAGAZINE to EVERYONE.

There is no truer test of a man's qualities for permanent success than the way he takes criticism. The little-minded man can't stand it. It pricks his egotism. He "crawfishes." He makes excuses. Then, when he finds that excuses won't take the place of results, he sulks and pouts. It never occurs to him that he might profit from the accident.—*Thomas A. Edison.*

A FEW SUGGESTIONS FOR INSPIRATIONAL MOTTOES

Leslie J. Miller, Supervisor of Industrial Arts, Rock Springs, Wyo.

These mottoes may be lettered and hung in the shop or, if neatly lettered and framed, they should make acceptable gifts.

An Optimist is a man who takes the cold water thrown upon his proposition, heats it with his enthusiasm, makes steam and pushes ahead.

Success depends upon your ability to make the best of getting the worst of it.

The instinct of workmanship brought mankind from the brute to the human plane.—*Veblen.*

The world isn't half so much interested in the reason for your failure as it is in the formula for your success.—*J. P. Fleishman.*

No one is useless in the world who lightens the burden of it for anyone else.—*Dickens.*

Show me a man who makes no mistakes and I will show you a man who doesn't do things.—*Roosevelt.*

Start an epidemic of good will and optimism in your community and then keep out of the way of good luck if you can.

Be good natured. Everybody wants the good natured man to succeed.

We should be as generous with a man as we are with a picture, which we always give the benefit of the best possible light.—*Emerson.*

How much better it is to listen to divergent views with a real desire to learn. The greatest of men have learned much from the ignorant, merely by listening.

It is not necessary to show animosity in order to win a discussion and you can prove your points without making the other fellow feel foolish.

Make your stumbling blocks serve as stepping stones.

MANAGEMENT OF FARM SHOP WORK

David B. Hendrix, Byington, Tenn.

In organizing the course in farm shop we should first determine the object or purpose of the course. It is generally agreed that the purpose of the farm shop course is "to train boys to do the ordinary construction and repair work to be done on the average farm with the tools the average farmer may reasonably be expected to have." This should be kept in mind in equipping the shop. Too often we find the shop equipped with expensive tools and apparatus which we could not reasonably expect the average farmer to have. To illustrate: A good workman with a reasonable amount of ingenuity can make almost anything in woodwork that he finds it necessary to make with a hammer, saw, square, hand axe, and pocket knife, and these tools will be found on practically every farm.

Next there comes the problem of selecting the teaching content to use in the accomplishment of this purpose. This will be partly determined by the conditions which prevail in each community. Obviously there would be some difference in the shop work most necessary in a dairy community from that in a truck or general farming community. However, there are several phases of work that every farmer should know something about, namely, woodwork or carpentry, metal work, harness repair, soldering, concreting, painting, rope work, and farm mechanics or general repair work, and these should be stressed according to their importance in the community.

After determining the amount of time to devote to each phase of the work, we have the problem of selecting its place in the course. Many teachers of shop give woodwork the first year; iron work, rope work, soldering, etc., the second and third years; and farm mechanics the fourth year; but if we keep in mind our first objective this plan is evidently not satisfactory. First, we know that every boy will not complete four years of high school work, and even those who do will not take agriculture the entire four years. These boys, then, will evidently be trained in only a part of the work they will find to do. Secondly, there is a wider divergence of ability among boys in shop work than in their ordinary class work. We commonly find boys in the first year who can do more and better shop work than many boys who have had four years of work in shop. This is due to inherent or natural ability and also to the training they have received at home. Therefore, we should arrange to give every boy the fundamental training in each phase of shop work the first year, beginning, of course, with the simpler jobs and attempting the more difficult ones as skill is acquired. This method provides enough practical training to enable the boy to do some work in each phase if he should drop out the first year.

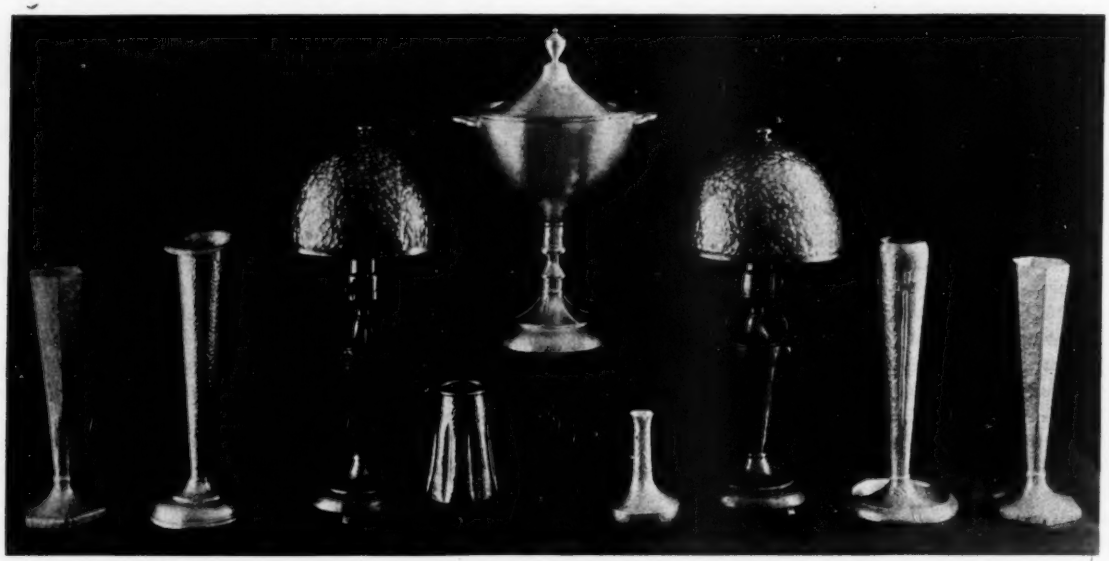
The successful management of shop work depends largely upon organization. Every boy should first be thoroughly instructed in the use and care of tools before beginning actual work. No boy should be allowed to work in the shop until he has learned the fundamentals of keeping tools in shape. It is generally best to have each boy learn every tool and part by name. Then teach him how to oil, handle, set, and sharpen them until he knows these points thoroughly. At this time it is well to teach the importance of buying good tools and try to instill into him a love for tools. He will then be ready and eager for work.

Each desk should have its own set of tools and not more than two boys should work at one desk or bench. The boy should know that he is responsible for the condition of his desk and tools. If he knows this, he will usually take pride in keeping them in good shape.

I find it satisfactory to hang the tools up on the wall behind the bench and paint the wall black behind each tool so that there will be no trouble in putting tools in place and getting them when wanted. When piled up in a chest or drawer there is much waste of time hunting for them and much more likelihood of their getting damaged.

Next, never allow a boy to run out of work. The shop should be a work room, not a loafing place. A supply of materials can be kept on hand for boys to use when they have no work or material of their own. This may be either sold or given to them to make some article for the shop or school. The articles may be sold and the money used to buy new materials and tools.

The instructor should grade each job done and each article made, giving proper credit before it leaves the shop. In this way the boys are induced to try to do good work. If for no other reason, than to get good grades, the boy will do good work if he knows that his shop work is counted as a part of the final grade in the course.



TYPICAL ART METAL PRODUCTS MADE BY STUDENTS AT THE STRONG JUNIOR HIGH SCHOOL, GRAND RAPIDS, MICHIGAN, UNDER THE DIRECTION OF MR. H. M. DEXTER.

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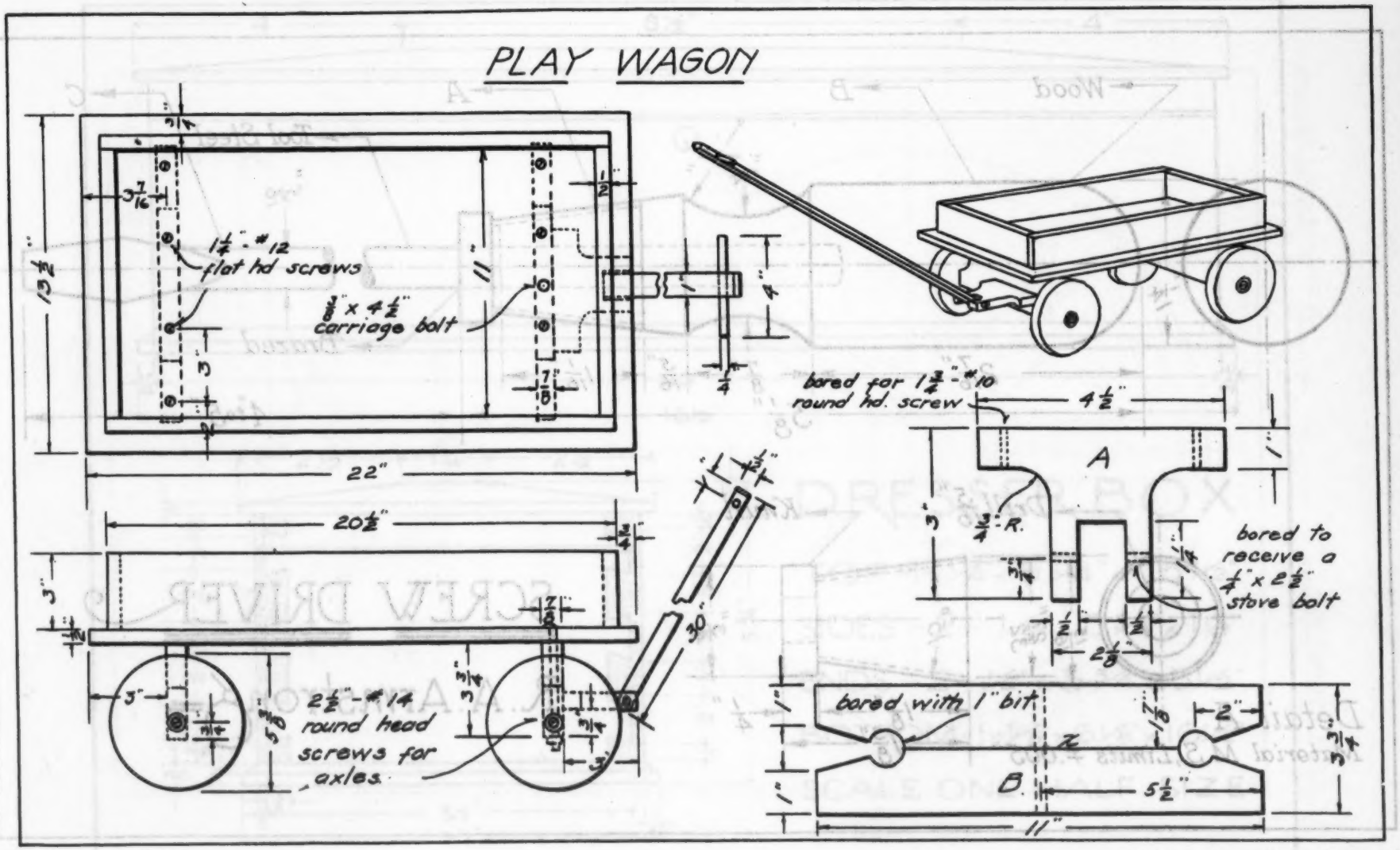
PLAY WAGON



Drawing by Leon H. Baxter, Hudson, Ohio.

For Details see Page 28, Industrial-Arts Magazine, January, 1927.

DRAWN

SCREW DRIVER

Q = Quantity required

Material: Tool steel

Detail A

Detail of B: Wood, Brass

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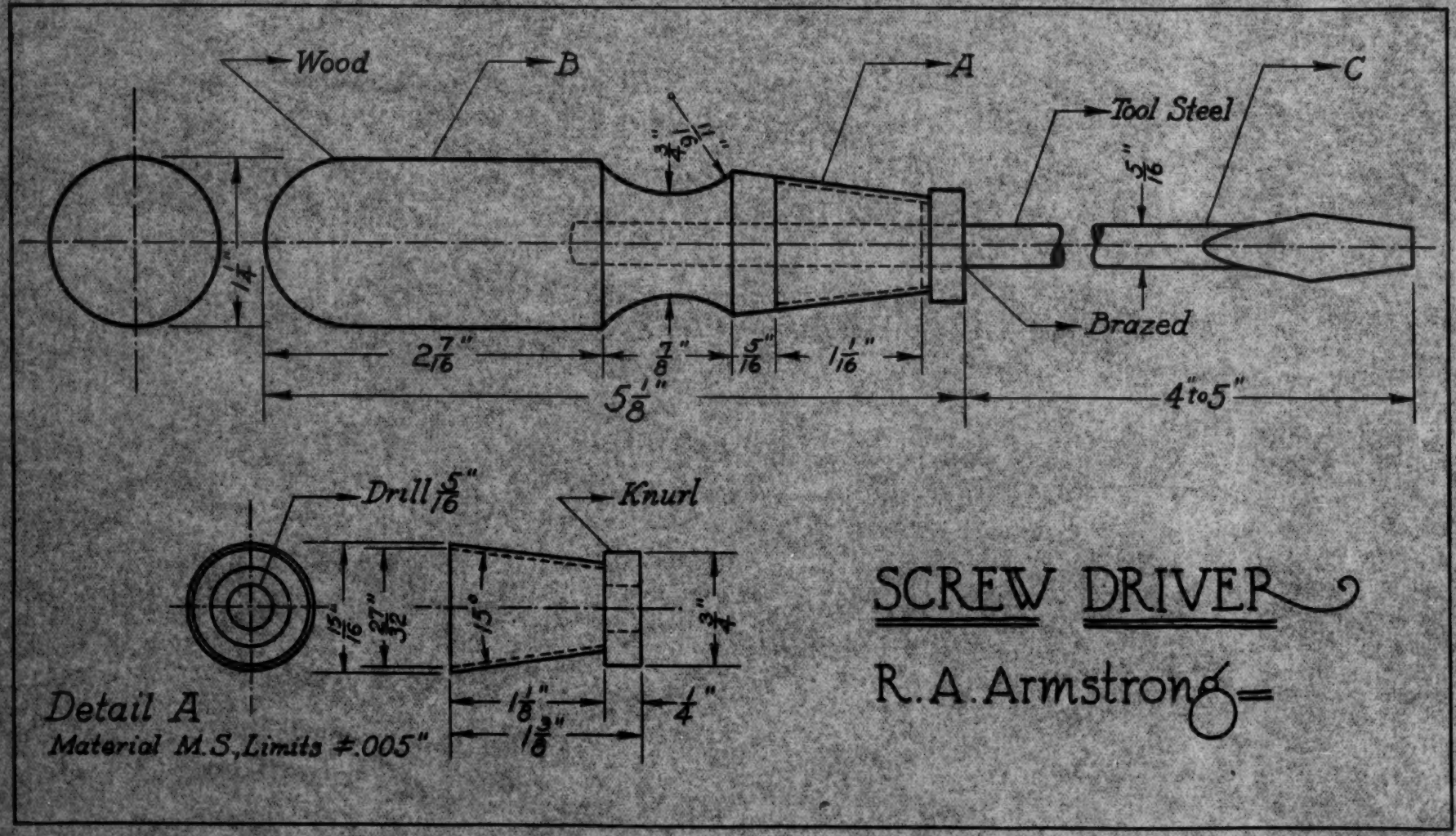

Drawing by R. A. Armstrong, Aberdeen, S. Dak.

For Details see Page 28, Industrial-Arts Magazine, January, 1927.

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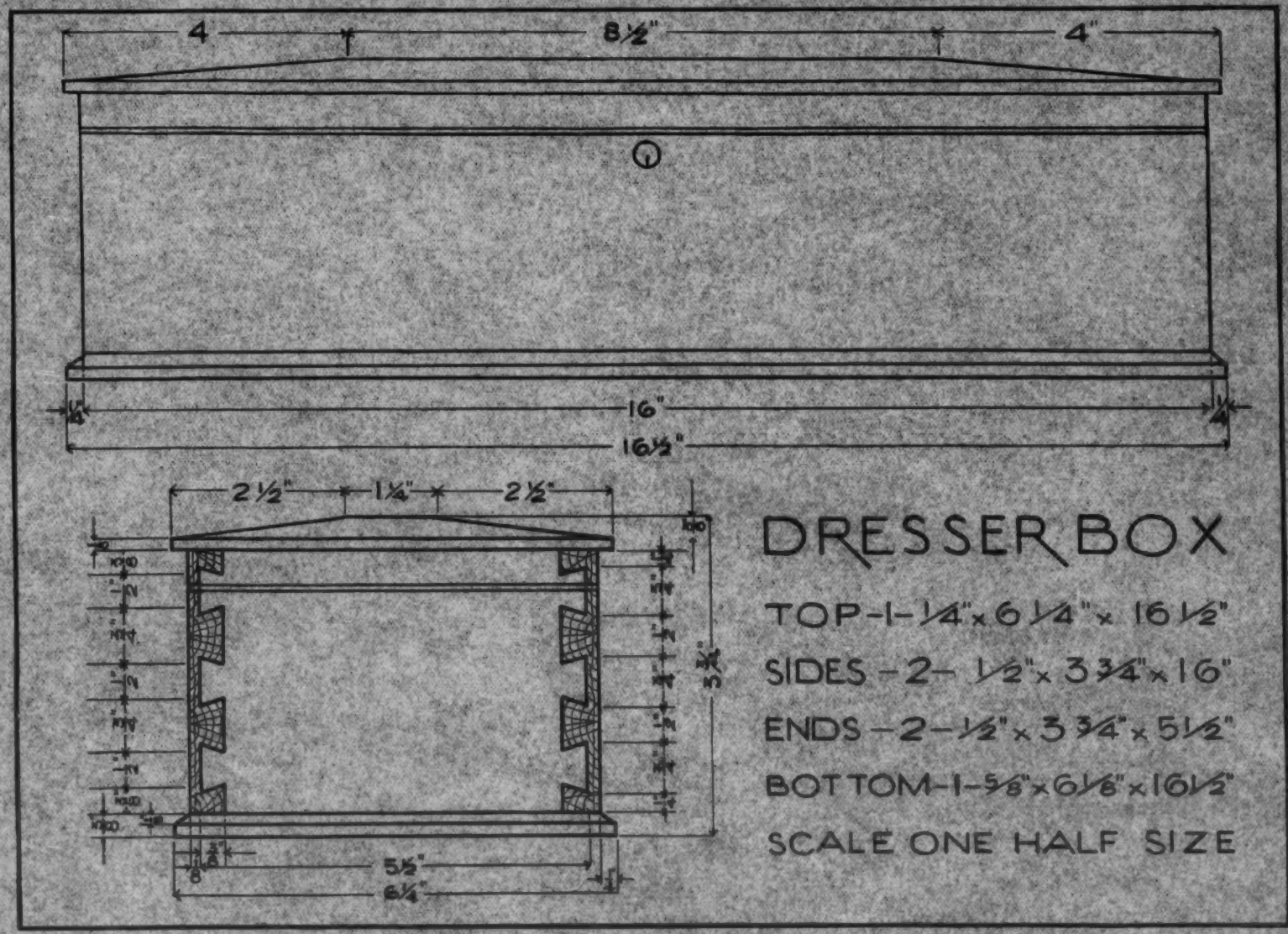

Drawing by Everett M. Stanley, Waterbury, Conn.

For Details see Page 28, Industrial-Arts Magazine, January, 1927.

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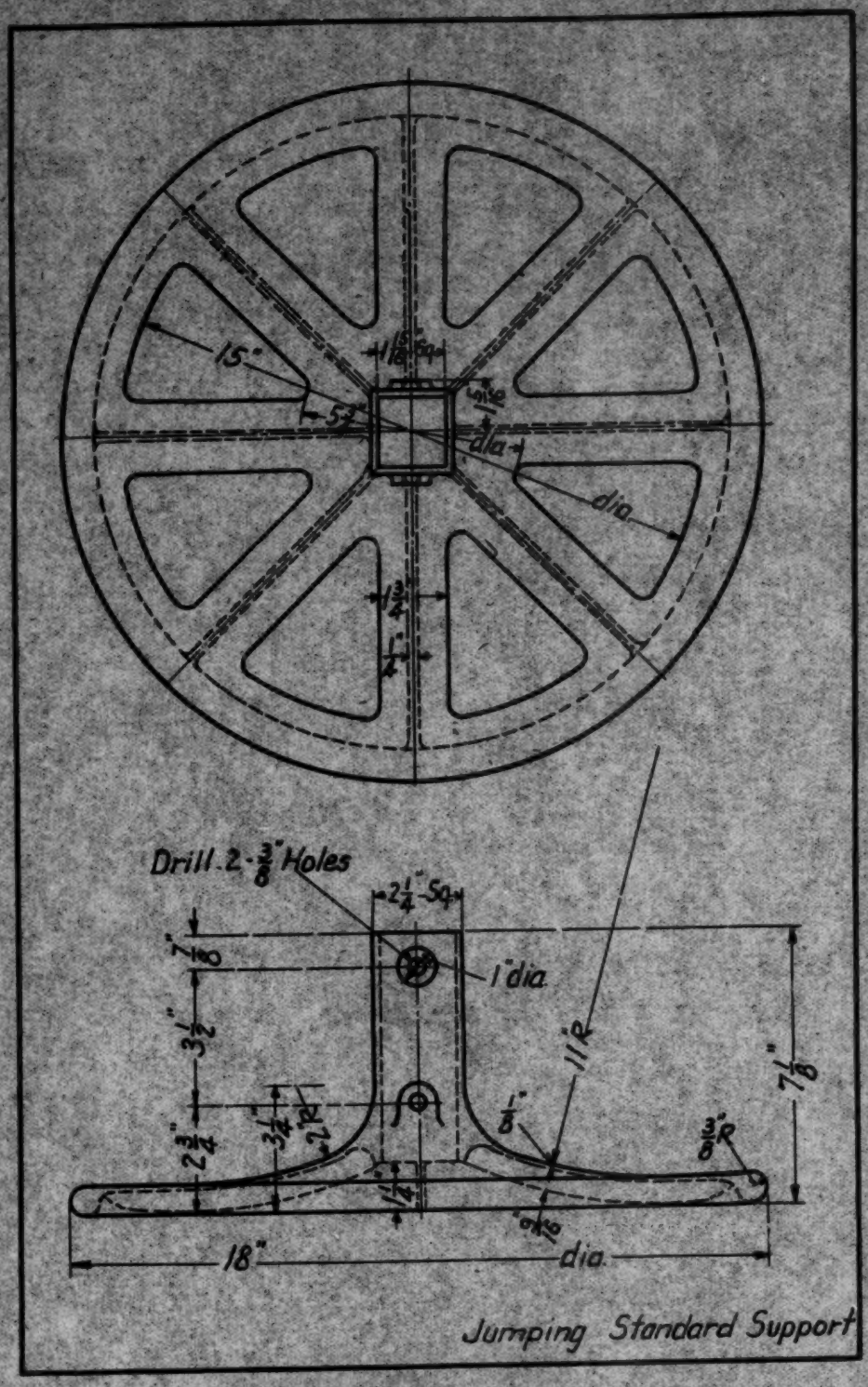


For Details see Page 28, Industrial-Arts Magazine, January, 1927.
Drawing by J. A. Miller, New Kensington, Pa.

SHEET METAL AND ART METAL WORK

H. M. Dexter, Strong Junior High School,
Grand Rapids, Michigan

In a preceding article the writer detailed the processes of making salt shakers based on the frustrum of a cone. Other useful problems may be based on this same shape, and it will perhaps be interesting to study some of the articles produced in the writer's classes, especially at this season of the year when the making of Christmas presents is in order.

Interest in any project can be aroused by leaving the choice of the article as well as of its design to the pupil. A wise teacher, however, makes definite suggestions and leads the pupil in the choice of projects which have the maximum instructional values.

The flower vase shown in Figure 1 is selected by most of the writer's pupils as the second or third project in art metal work. The pattern of the conical part of the vase is first drawn and then transferred to gauge 24 copper. The metal is cut to size and shape similar to the pattern. Sharp bevels are next drawn out on the two straight edges, A and B, Figure 1. The metal is then scraped ½" wide on both sides of the beveled edges. While scraping, care must be taken that the metal does not come in contact with oil, grease, or soap because these substances make a perfect joint impossible. After scraping, the metal is bent to the shape of the cone, the two edges overlapping about ¼". The cone is not necessarily perfectly round, but care is taken that the edges are tightly jointed so that a smooth seam will result.

We are now ready for brazing. Before this operation is undertaken the article is rinsed well in fresh water. The metal is struck lightly on the seam with a small hammer so that the rinsing water passes between the two edges. After rinsing a borax solution is poured inside the cone and the metal is struck again so that the solution reaches all parts of the joint. Now, holding the cone seam downward in the left hand, the worker pours a little spelter, which has been previously mixed with borax and water, into the inside of the seam. A spoon or paddle is used and care is taken that the inside of the seam is well coated with the spelter. The cone is now held level, seam downward, over a strong gas flame. The cone is heated from the end nearest the worker. In the beginning the heat is applied lightly until the spelter and borax become dry and care is taken that the borax will not boil or move away from the seam. When the spelter and borax is dry it becomes white like popcorn and then the heat may be increased. The borax will next change to black, then to red, and finally melt like water.

When the spelter begins to melt the farther end of the cone is lowered so that the molten spelter runs along the

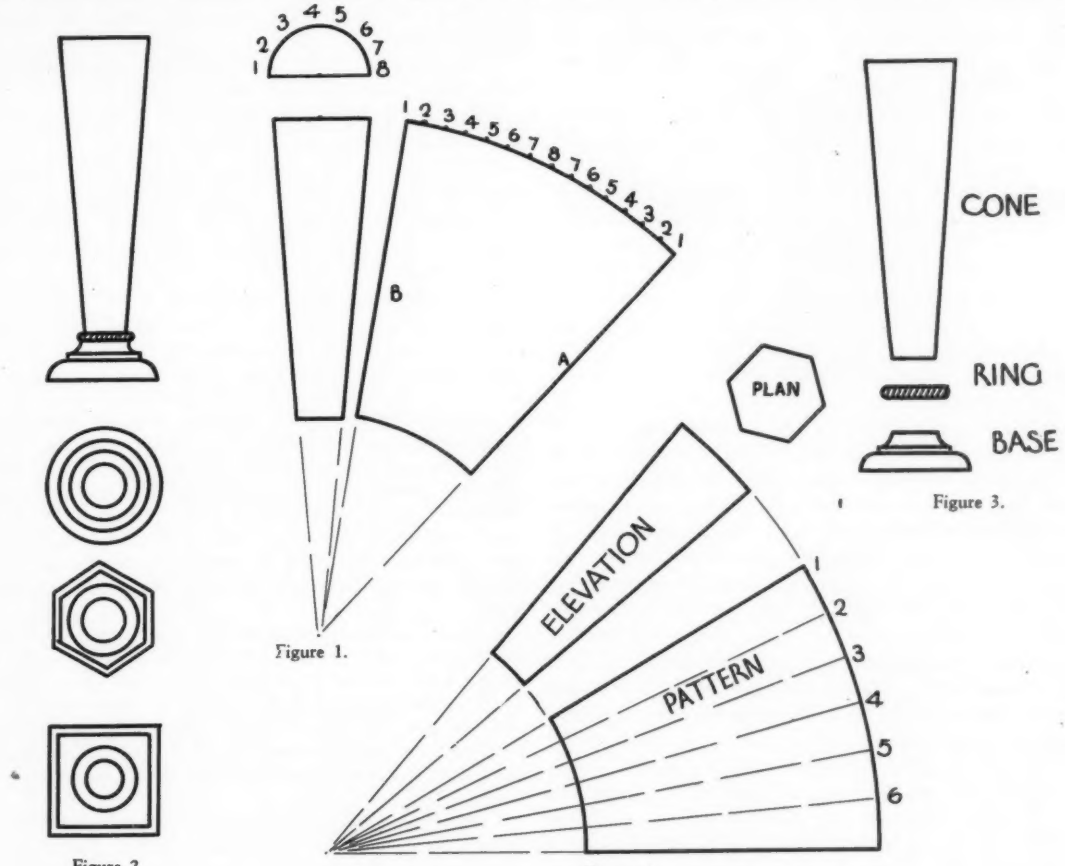


Figure 2.

Figure 3.

Figure 4.
CONSTRUCTION DETAILS OF A VASE.

inside of the seam to the lower end. Meanwhile the article is drawn over the flame toward the worker until the flame is below the farther end.

After the seam is perfectly brazed, the cone is cooled off, dried, and filed fairly smooth in the seam. It is then drawn on a cone-shaped steel tool and with the flat part of a hammer the seam is stretched. This is done until the eye is not able to detect the seam. It sometimes occurs that the seam becomes so hard that the worker is unable to hammer it out as smoothly as desired. If such is the case, it is necessary to anneal the cone at the seam and hammer again after cooling.

A brazed article must not be hammered while hot because the seam is likely to break open.

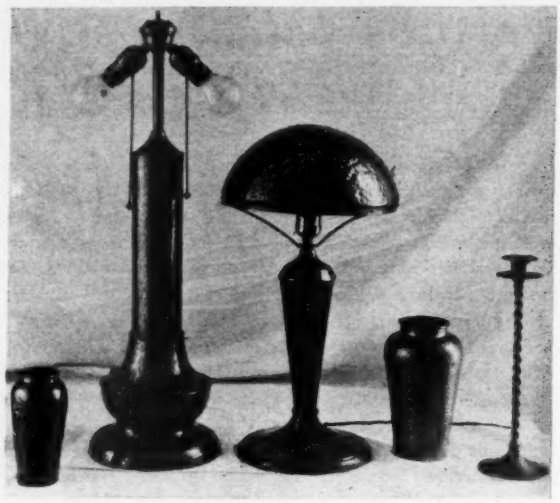
Before proceeding to finish the article, it should be annealed again, cooled, dried, and rounded into shape with a wooden mallet. It is then to be given a bath of diluted sulphuric acid and allowed to soak in a solution of common salt and water for thirty minutes. It should now be rinsed in fresh cold water, scrubbed clean and bright, and dried with sawdust. The cone should now be hammer finished and the top and bottom should be straightened by filing.

The worker may now begin the base of the vase. If the instructor is capable of doing metal spinning, the base is easily made. If the instructor is not familiar with metal spinning processes, a wooden block may be turned to size and shape to fit the cone part of the vase. This block will help considerably in forming the base.

The base of a metal vase may be done as follows: Measure up the wooden block base from center to edge and draw a circle on copper, gauge 22. Cut out the metal disc, making sure that the center is clearly marked. Next take a piece of wood and cut into it a hole which is roughly the size and shape of the proposed base of the vase. The metal disc should then be driven into the cavity with the large end of a ball-peen hammer. The copper may be removed and should then be annealed, cooled off, and dried. It is now soft and pliable. If it is placed over the base of turned wood, it will be easy to shape the copper over the wood. If the results are not satisfactory the first time, the base may be annealed and shaped again. When the base shape is completed, it is ready for hammering. This is done by filling the inside of the base with molten lead, after rubbing it with chalk or clay to prevent the lead from sticking to the copper. When the hammering has been done, the lead may easily be removed. If the lead should stick, it will be necessary to remove it by heating, and heating softens and injures the vase.

In hammering the lead-filled base, the worker should be careful not to hammer it out of shape. When the lead has been removed, the edges should be filed straight so that the base will stand level. After leveling the edge of the base, a ring of copper wire is made to fit the smaller end of the conical part of the vase.

The worker now has completed the three parts of the vase, namely, the top, the ring, and the base. (See Figure 3.) The three pieces are now given an acid cleaning and scrubbed. The ring is slipped over the small end of the cone and is dipped into a soft soldering flux (glycerine oil and hydrochloric acid mixture). This end is now set on top of the base and the three parts are soldered together by heating slowly with a blow torch or gas flame applied to the ring. While heating at this spot, hold a piece of solder wire in the right hand, touching it frequently to the ring; between such touchings tip the wire into the flux to make sure that there is ample flux in the joint and that the joint is uniform. Care should be taken to avoid too much heat.



TYPICAL SHEET METAL PRODUCTS OF THE AUTHOR'S CLASS.

Cut a disc of copper to fit the bottom of the base. Before soldering the disc in place, roughen one side of it with the point of an old file so that a piece of felt may be glued under the entire base.

The top edge of the vase should be sandpapered and, if the worker sees fit, a border may be engraved

The vase is finished by polishing or oxidizing, or nickeling, or silver plating, and is finally lacquered.

The vase may be made round as described. Square or hexagonal shapes, as shown in Figure 2, may be employed. The pattern for the hexagonal vase is drawn by the radial method, as illustrated in Figure 4. The pattern for a square vase is drawn in the same way.

For vases other than those having a round shape, it is best to make a butt joint at the seam and to make the seam at the middle of one of the sections.

TEACHING RELATED AND REQUIRED SUBJECTS IN THE PART-TIME SCHOOL

Mr. E. J. Couvillion, speaking on the "Teaching of Related and Required Subjects" at a recent meeting of New York educators held at Buffalo, declared that the work of the part-time school must be specific and the needs of special classes or types of work must be met. The teacher must take into consideration the mental level of the pupil, and the subject-matter must be varied in accordance with the occupation. Certain parts of the course of study will carry over into all trades.

Mr. Couvillion pointed out that there are many ways of securing the subject-matter most suitable and one of the best means is in the use of surveys. The principles which are operative in making an occupational analysis and the job analysis must be kept in mind. There must be direct contacts with the employer and the job in order that the school may meet the demands of part-time pupils in a satisfactory manner.

Pupils in part-time schools should be organized into groups whenever possible, according to Mr. Couvillion, and the school experience must carry through every grade of the elementary school and advanced work. All instruction, he emphasized, should be based on adolescent psychology and not on the psychology of instruction in the lower grades. Effective teaching, he said, involves an appeal to the interest and the initiative, the use of appreciative power, knowledge of the individualism of youth, and an appreciation of the "gang" spirit. Daily experience of the home, the street, the farm, and the shop furnish the opportunity for the teacher to direct the activities of the pupil.

THE NEED FOR COLOR WORK

Hazel F. Showalter, Davenport, Nebr.

PRACTICALLY EVERYONE who makes things with his hands, from the little child in kindergarten, eager to exchange pencil for crayon or paints, to the skilled worker pleased with a bit of color harmony—practically every worker feels the desire, we might say need, for working with colors. In the manual training classes this desire may be satisfied by the making and decorating of little wooden novelties, using enamel for the colors.

Among the simple articles that may be made from wood and decorated in colors with enamel are book ends, letter racks, plant sticks, window wedges, curtain pulls, match safes, and

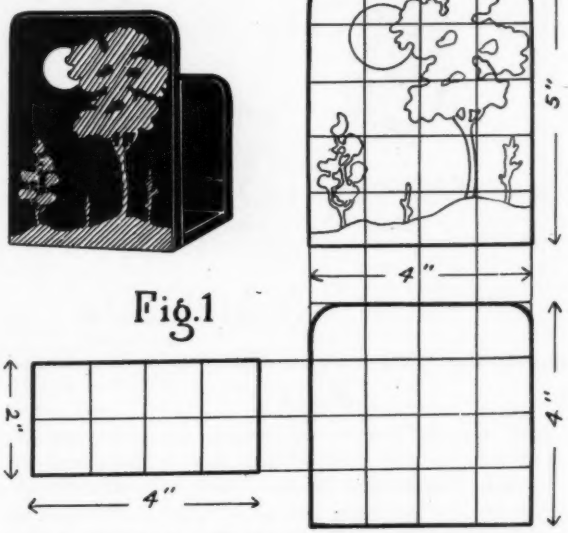


Fig. 1

toys of many kinds. Working drawings are given here for a letter rack, for book ends, and for a tie rack. These drawings are marked off into squares which are to be enlarged to one inch. Though the student may not be trained in drawing, he can easily draw the designs in the corresponding squares.

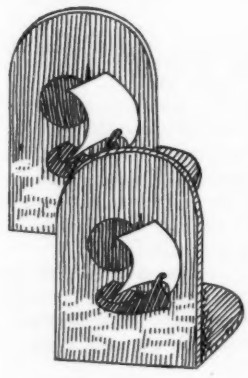
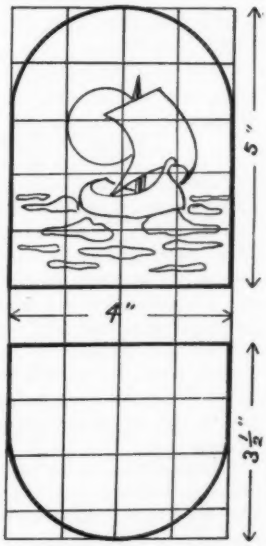


Fig. 2



The letter rack, shown in Figure 1, is made of three pieces glued together. The design should be marked out in pencil on the larger piece. After the parts are glued together, the entire rack should be enameled. Black or very deep blue could be used for the sky and for the parts of the rack not including the design, with pale yellow for the moon and light blue-green for the trees, shrubs, and ground. Instead of the two latter colors, orange might be used for the moon and brownish green for the foliage and ground.

Book ends are always made in pairs. As shown in Figure 2, book ends are made in two pieces glued together. Use a light bluish-green enamel for coating the book ends but omit the moon, the boat, and the waves. It probably will be necessary to mix the colors to obtain the desired shade. This back-

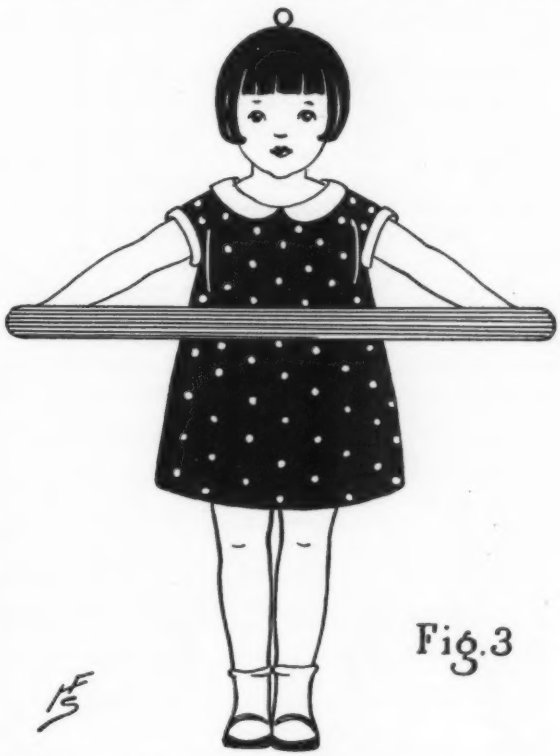


Fig. 3

ground coat will furnish the color for the sky and for the sea. Enamel the sail white, the moon red, the boat brown, and the waves a very light shade of the background color made by adding white to it. This design might be used on the letter rack, or the design shown on the letter rack for the book ends.

The tie rack, Figures 3 and 4, is made in the form of a little girl, holding a rod over which the ties are thrown. The figure of the child is 12″ by 16″. The rod is 12″ long by ¾″ wide. These small pieces are fastened by screws to the figure's hands (the heads of the screws should be flat with the wood). The rod is fastened to these small pieces with screws (brass screws with ornamental heads may be used here). There is a screw eye in the top of the head by which the rack may be hung on the wall or on the inside of a closet door. Various color schemes might be used for this rack. The little girl might have hair and eyes of any natural shade.

The only thing particular is that the color of the dress go well with the color of the eyes and hair.

A plant stick is an interesting project for original work. Let the pupil choose his own design, tracing if he likes a picture of a bird or animal from a book and copying it in natural colors. All that is necessary besides the small colored figure is a slender stick and its size may vary. There is no need for any detail work or shading on any of these novelties. The flat tints are quite attractive.

A window wedge is also suitable for original work. The design shown for a wedge has the figure of an owl, with a rounding wedge-shaped piece at its side, all cut in one block. The shape of the wedge may vary as one likes, and the ornamental figure may be anything whatsoever that takes one's fancy. (These window wedges are used to stop the windows from rattling on windy nights.)

Curtain pulls are made from thin little pieces of hard wood (wood from cigar boxes may be used). Each pull must have a little hole or an opening near the upper end through which the cord may be fastened. Curtain pulls are often long and slender, though they may be cut in any sort of ornamental shape and may be finished in any colors.

It has often been very handy when an unusual color is desired or only a very small amount of one color is needed, to dissolve a bit of sealing wax in denatured alcohol to be used in the place of ordinary enamel. The sealing wax comes in small sticks of almost every shade. It is often possible to find the color that is wanted in a stick of sealing wax when it cannot be obtained in enamel. Then, too, a stick of sealing wax may save the buying of a whole can of enamel when only a bit of a certain color is needed. To make the sealing wax enamel, break as much wax as is needed into a little covered jar such as a vaseline jar, pour denatured alcohol over it, cover it, and let it stand over night. An occasional stirring will greatly hasten the dissolving. To make the enamel of the correct consistency, either add alcohol to it or let the surplus alcohol evaporate. Use this enamel in the same manner as ordinary enamel.

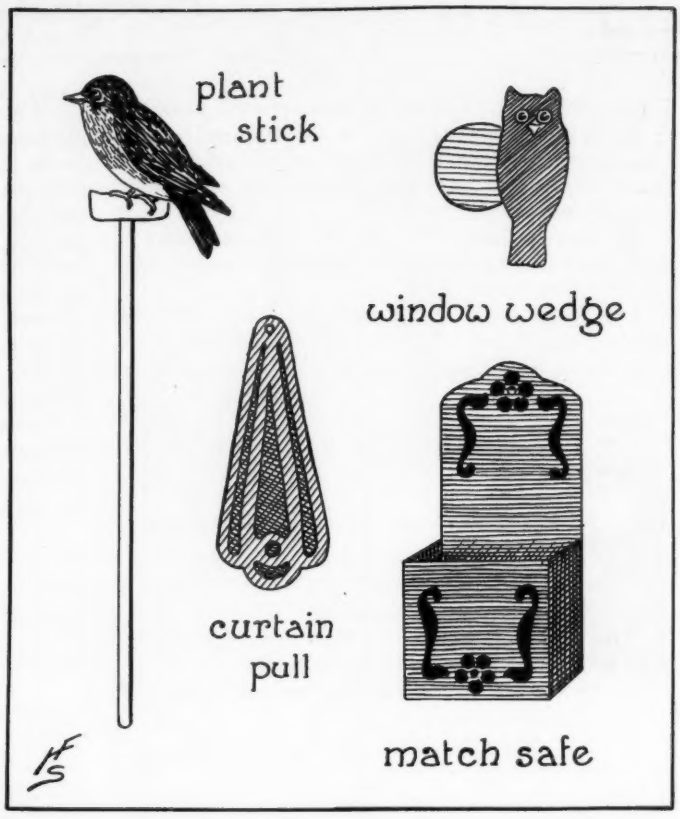


FIGURE 5.

The usual practice is to make up colors with artists' tube colors, dissolved in white enamel.

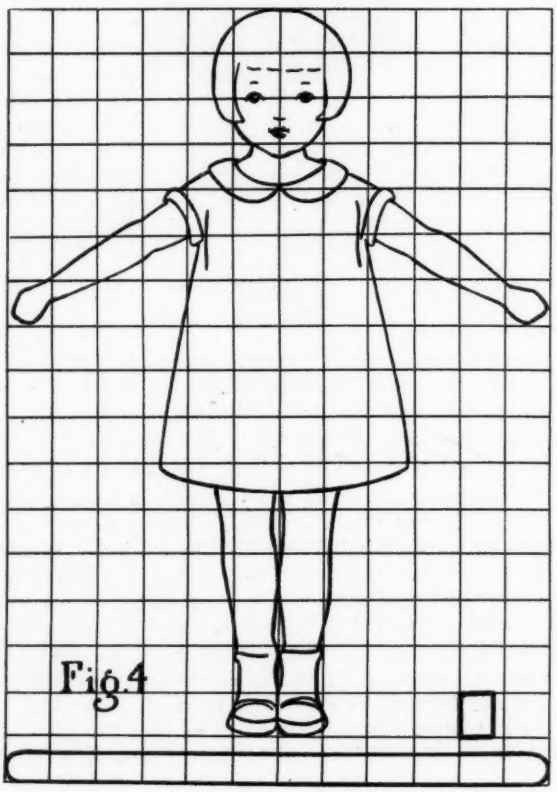
A SHORT METHOD OF FIGURING FOR BOARD OR OTHER SUPERFICIAL MATERIALS

Wilfrid Bowdler, Elyria, Ohio

The following method of figuring board, or other superficial measure, is one that I have used for over 25 years, and have taught in the manual training shop on several occasions, when such figuring became necessary. I have never been able to find anything simpler once the system is fully grasped, the greatest difficulty seeming to be that the answer is in superficial or surface feet, and not in square feet.

For the purpose of clearness, let us not use the term "square feet," but superficial feet; as other dimensions besides 12″x12″ represent a superficial foot. The usual method of finding the square footage of an area is generally taught as follows:

Reduce the feet to inches, add in the inches given in the problem, multiply them together and divide the result by 144. On large areas, and where many pieces are to be figured, it makes very large numbers to handle, which is quite unnecessary.



Twelve inches by 12 inches is considered a superficial foot, and as there are 12 inches in a running, or lineal, foot, why not consider that there are 12 superficial inches in a superficial foot? If this be the case, then 12″x1″ would constitute a superficial inch. One inch by one inch would be a twelfth of a superficial inch, known in this system as "a part." Following from this it can be seen that 1″x12″x12″ is a board foot, 1″x1″x12″ is a board inch, and 1″x1″x1″ is a board part.

The rules governing this are as follows:

(1) Feet multiplied by feet give feet.

(2) Feet multiplied by inches are inches.

(3) Inches multiplied by inches are parts.

To multiply them together proceed in this manner:

Place the feet under the feet and inches under inches and multiply as usual, but remember to carry the parts back to a column of their own, to the right of the inches. Always divide by twelve.

As an example, find the area of a door 2′-8″x6′-8″:

```
6′—8″
2′—8″
-------
4 —5″—4
13 —4
-------
17′—9″—4
```

Taking the inches first, 8x8 inches is 64 parts, divided by 12 gives 5 inches and 4 parts; 8 inches by 6 feet is 48 inches, plus 5 inches, brought forward from the parts, makes 53 inches, divided by 12 makes 4 feet 5 inches. Next, 8 inches by 2 feet is 16 inches divided by 12 gives 1 foot 4 inches. Next, 2 feet by 6 feet is 12 feet, plus 1 foot, brought forward from the inches, makes 13 feet. Adding now, makes a total of seventeen feet, nine inches and four parts. If a fraction is preferred, a third of an inch, or five-sixteenths.

Fractions of an inch can also be used, by converting them into the nearest twelfths of an inch. These, when multiplied together, will make "parts of parts," and when divided by 12 will give parts of an inch, which, if necessary, may be converted back to eighths.

It is not necessary to consider the items exactly in the order in which they are given. They can be turned around in any manner that will make them easily worked mentally. Consider the first item given in the examples below. This may be taken just as it stands or in any of the orders as follows: 14 pieces 2″x8″, 17′0″, or 16″x17′-0″x14, or 28x8″x17-0″, or 14x8″x34′-0.

When several items are given, they are multiplied out and then added together, each column being subsequently divided by twelve and carried to the next higher column.

Examples:

How many board feet in the following:

14 pieces 2″x 8″ 17′—0″
22 pieces 1″x10″ 14′—0″
5 pieces 6″x 8″ 10′—0″

```
14          14          6
 1— 4       10″         8
-------     -------     -------
 5— 6       11— 8       4— 0
14          22          50
-------     -------     -------
19— 6       256— 8      200— 0
 17
-------
 8— 6
133
19                  Adding for total  200
-------                               256—8
331— 6                                331—6
                                      -------
                                      788—2
```

This can be very much further shortened by taking the inches as fractions of a foot, as in taking proportional parts.

Find the board feet in:

15 pieces 16″x2′9″

```
15
 1—4
-------
15—0
 5—0  4 inches being ⅓ foot, 5 being ⅓ of 15
-------
20—0
 2—9
-------
40—0
10—0  6 inches being ½ foot, 10 being ½ of 20
 5—0  3 inches being ½ of 6 in., 5 being ½ of 10
-------
55—0
```

Thus, in multiplying by eleven, take 6, 3, 1, and 1, and add. Example: 4′-10″x11″.

```
   2—5
 1—2— 6
   4—10
   4—10
-------
 4—5— 2
```

How much plaster required in a room 12′-6″x10′-9″, 8′-6″ ceiling?

```
12—6                          25—0
10—9                          21—6
-------                       -------
 6—3    ½ of 12—6             46—6
 3—1—6  ½ of  6—3              8—6
                               -------
125                           23—3  ½ of 46—6
-------                       372—0
134—4—6                       -------
                              395—3

      134—4—6
      395—3
      -------
      529—7—6
```

529 feet 7½ inches.

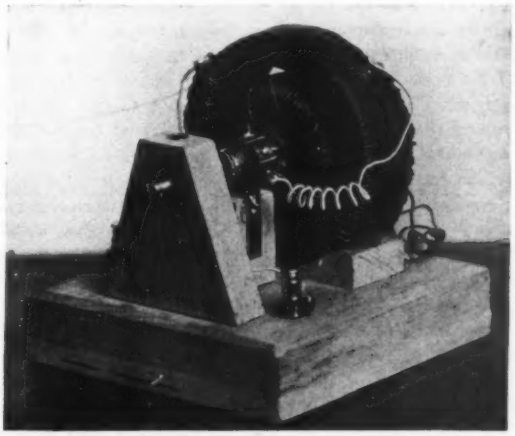
Many further examples could be given, but I think these ought to be enough to make my points clear. With a study of this system many interesting combinations can be worked out. Lumber bills can be compiled with great accuracy and speed. Plastering and painting can be estimated.

A SMALL ELECTRIC MOTOR

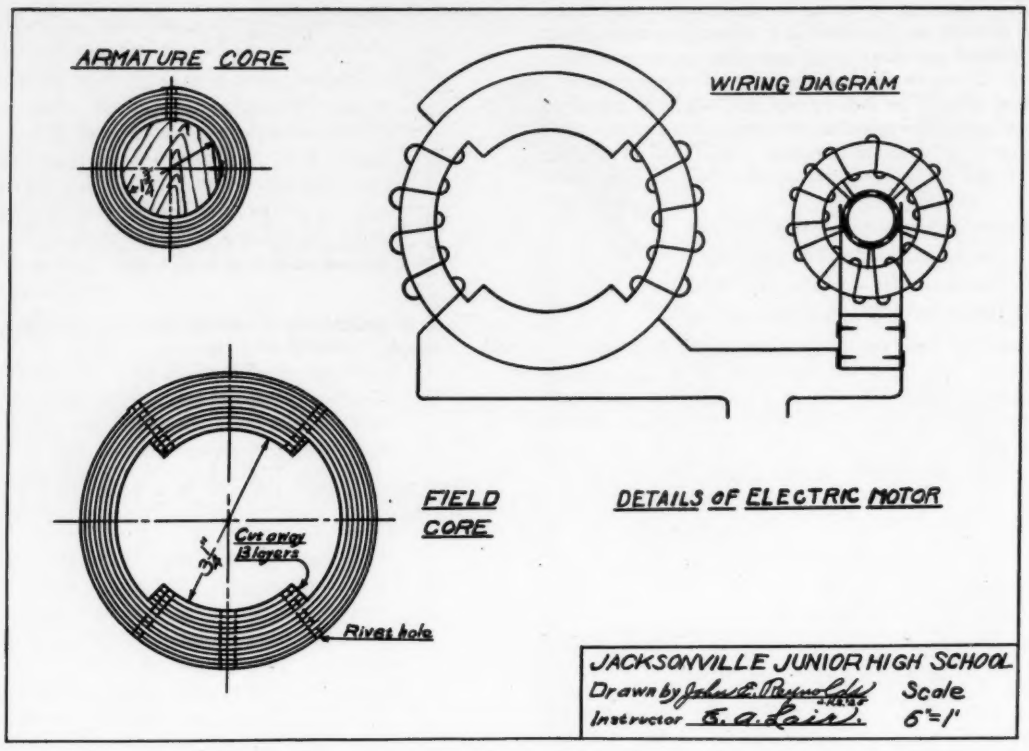
E. A. Lair, Jacksonville, Ill.

The building of a small electric motor can be made a most instructive problem for the average junior high school boy. Several of the motors described were made in the author's class with much success. While the boy is making a good piece of machinery he is also learning the principles of electricity. The average cost for these motors is very small.

This motor is intended to turn a fan, light machinery, or toys requiring a similar amount of power. It is so simple that it can easily be constructed with the tools ordinarily possessed in the average shop.



THE MOTOR READY TO RUN.



The first thing to be made is the armature—the part which revolves. The core of this armature is made into a ring formed of No. 28 gauge sheet iron (black iron) by wrapping a strip 1″ wide and 8′ long upon a cylindrical piece of wood in the lathe or by hand. This cylinder is 1¾″ in diameter and 1″ thick. In the edge of the cylinder is cut a shallow notch for tacking the end of the sheet iron. When the strip of iron has been wound on the mandrel, a piece of binding wire is wrapped around the coil and twisted to keep the iron from unwinding. The wood and the coiled sheet iron are then placed in a fire and heated to a cherry red, at the same time burning out the wood. The ring should then be removed from the fire, covered with ashes and allowed to cool slowly. This anneals the iron and improves its magnetic permeability.

When cooled and while the wire is still in place, the ends of the ring are secured by passing rivets through them. Now tape the ring and it is ready to receive the magnet wire. The ring is divided into five equal parts and marked. There are five coils on the armature with five layers in each coil. No. 21, 22, or 23 single or double covered wire is used. It requires about twenty-six feet for each coil. It will be necessary to wind the length of wire for one coil on a shuttle stick. To begin winding, the end of the wire is wrapped two or three times around the ring over a stout thread, which is tied around the wires to fasten them together, to begin a coil. The beginning, of course, will be at one of the marks on the ring. The coil is then wound on, the last two or three turns being made over a stout thread, which is tied when the last convolution is made. Now wind the other four coils in the same direction, and when the winding is all on, the end of the one coil is twisted with the beginning of the adjacent coil. They are later soldered to the commutator bars.

The next step is to construct the hub and shaft for the armature. A No. 40 or 50 thread spool will be necessary for the hub. The size of the spool depends on the size of the hole left in the armature ring after the coils are wound on. Cut away the flange on one end of the spool and force it into the armature ring, until the other flange on the other end of the spool fits up snugly against the ring. This forms a hub neatly centered in the ring, also a hole through the spool to be used for the shaft.

Now apply two coats of shellac, allowing each coat to dry thoroughly. Also apply a small amount of glue around the spool on the side cut away, allowing it to run down freely between the windings and the spool.

The shaft is a piece of 4/16″ drill rod about 5″ long. Drill a 1/16″ hole transversely through this near the center, to receive a short pin which enters a slot in the end of the spool.

The next thing to construct is the commutator. Another spool will be necessary here, cutting off both flanges and fitting it inside a brass tube one inch in diameter and one inch long. The tube is then divided into five parts, horizontally, parallel lines being drawn at each division point, making the places where the tube is to be sawed to form the commutator bars. Before sawing, each end of each space to form a bar is drilled, and the hole is countersunk to receive a small wood screw. This holds the bar in place, when the brass tube is sawed on the lines to separate the bars. Now slip the spool on the shaft, pushing it well up against the other spool, forming the hub of the armature. The twisted terminals of the coils are now stripped of the winding at the ends and soldered to the commutator bars.

The next thing to construct is the field magnet. The core of the field magnet is formed much like the core for the armature by winding four strips of No. 28 gauge sheet iron, 1″ wide and 8′ long upon a wooden core. This form should be 3/16″ larger in diameter than the finished armature, and as this is variable, it must be ascertained after the armature is wound. The ends of these four strips should be beveled off, tinned and soldered together. As it is not necessary to anneal the field magnet, remove the wooden form, and divide the ring into four quarters by radial lines and between two of these lines on opposite sides of the ring; drill holes for rivets, 3/16″ in diameter. Insert the rivets with

the heads on the inside. Now cut away thirteen layers of the magnet ring between the pole pieces to make a space for the winding. Tape the spaces cut away, and in these wind 42 feet of No. 18 magnet wire, single or double cover. One of the pole pieces will be at the top of the field magnet and the other at the bottom, when the motor is complete. Therefore, the winding on each side of the field magnet begins at opposite sides of the same pole pieces, and is wound in the same direction to bring the wire terminals to the base of the machine and to cause the current in the two windings to unite in producing a north pole at the top of the magnet and a south pole at the bottom.

Now drill a ¼" hole in the lower side of the magnet and tap to receive a machine screw, which passes upward through the base to hold the magnet The entire field magnet and iron core should be given two coats of thin shellac for insulation and protection.

The posts in which the armature shaft is journaled are bored to receive the shaft and these holes are counter-bored from the inner side of the posts. A rod of the same diameter as the shaft is placed in the position of the armature shaft and babbitt metal is poured into the openings around it, forming the journal boxes. A hole may be drilled in the top of each post before casting the metal, which forms an anchorage for the journal boxes, and after casting, the anchorage is drilled through to the opening of the journal box to form an oil hole.

Now center the armature in the field, cut off the posts the right length, and secure them to the base with screws.

Directly under the commutator attach a wooden block. At the sides secure light copper springs which bear on opposite sides of the commutator and act as brushes.

The screws holding the lower end of these brushes clamp the wires which extend down to the base. One is connected with one of the binding posts, and the other brush with the outside terminal of the field magnet. The outside terminals of the other field magnet coils should be connected together. A wire diagram is shown. The upper screws in the commutator brushes may be used for varying the pressure of the brushes on the commutator, the brushes being bent outwardly to admit of adjustment.

If the motor does not run in the right direction when finished transpose the wire connections at the brushes so as to change the direction of the current in the armature. This motor requires direct current, using about three volts.

A TRADE SCHOOL JOB

E. H. Kreider, Lancaster, Pa.

Briskly moving to and fro and squirming around the trees and shrubbery of the five acres of lawn surrounding the Thaddeus Stevens Industrial School of Lancaster, Pa., is a motor-driven lawn mower upon which is seated a student operator. By the clever combination of a Ford automobile and a horse-drawn lawn mower, the students, with the instructor's guidance, evolved the tractor lawn mower shown in the photograph.

Few persons who see this machine in operation would think that its motive power was nothing more than a "flivver" resurrected from the auto graveyard which a few dollars kept from the junk man's destructive hammer. The motor and differential gears were in good condition, and the wheels, tires, fenders, and other parts were removed and discarded.

The parts to be designed were the driving sprocket wheels, driving rolls, brackets for attaching same to frame, and the front bridge frame over the mower. The downward projecting arms of this bridge are provided with crotches at their lower ends, which fit over the cylindrical bearing boxes of the mower drive-roller. This permits free mower action

THE MOWER AT WORK ON THE LAWN OF THE STEVENS INDUSTRIAL SCHOOL.

while passing over irregular ground surfaces. The bridge is connected with a radius rod, which is pivoted half way back under the machine with a ball-and-socket bearing.

By means of a pinion meshing into a curved rack, which is cast in the top of the bridge frame and is controlled by the steering mechanism, the squirming action of the machine is obtained; the rear rollers follow in the exact path or track which the mower is cutting. This not only eliminates the rolling down of the uncut grass, but also allows close cutting to trees or other obstacles, without danger of the rear end of the machine striking them.

The rear axle and differential housing were mounted across the rear end of the frame to the height of the crankshaft, thus eliminating the universal joint in the drive shaft. The axle serves as a jack shaft and a speed reduction means through the two side chains to the large sprockets which are attached to the main driving rollers.

The horse-drawn mower was not altered in any way, the seat and shafts simply being removed. All the requisite parts of the machine were designed and made in the shops of the school, and are a sample of what is accomplished along practical lines at this institution.

Since the articles made in a school are merely by-products —and graduates turned out the product—the by-products, then, should be carefully selected so as to make the highest type of product.

THE MEETING OF THE EAST TENNESSEE AGRICULTURAL DEPARTMENT

The agricultural department of the East Tennessee Educational Association held its annual meeting on October 29th, at Knoxville.

Mr. J. C. Powell, of LaFollette, Tenn., talked on "Organization and Conduct of Day-Unit Classes in Agriculture"; Mr. D. M. Clements, state supervisor of agriculture, discussed "Plans and Policies for Part-Time and Evening Work in Agriculture"; Mr. D. B. Hendrix, of Byington, Tenn., talked on "Organization and Management of Farm Shop Work," and Mr. R. D. Maltby discussed "The General Relation of Vocational Agriculture to Rural Development.

At the business session, Mr. D. B. Hendrix of Byington, was elected president, and Mr. T. G. Chase, of Pikesville, was re-elected as secretary.

NORTH DAKOTA TEACHERS HOLD MEETING

The North Dakota Manual Training Association held its annual meeting on October 27th, at Fargo. The speakers were Mr. J. E. Bjorlie, state high school inspector, who talked on the subject, "Manual Training and Industrial Education Today," and Mr. E. W. Bollinger, of the State University, who discussed "What is New in Manual and Industrial Arts."

The meeting closed with the election of officers for the year. Mr. C. V. Lindeman, of Ellendale, was elected president; Mr. W. M. Todd, of Jamestown, vice-president, and Mr. J. H. Bricker, of Fargo, secretary.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

PLAY WAGON

Leon H. Baxter, Hudson, Ohio

(See Supplement No. 41.)

This sturdily built little wagon is well within the construction ability of boys 10 to 12 years of age.

The bottom is made of ½" pine, joining two pieces to get a width of 13½" and cutting them 22" long. These should be carefully jointed and glued together.

The long rails are ½"x3"x20½" and the short rails ½"x3"x11".

They should all be planed square and smooth and the long rails attached to the short with glue and 1½" No. 15 brads. This frame should then be attached to the bottom with glue and the same sized brads, spaced about 2½" apart. The frame should be ¾" from the edge all around.

The front and rear wheel braces, or supports, should be made ⅞"x3¾"x11".

Figure B on the drawing shows how to lay out the design, boring the holes with a 1" bit, where indicated, and sawing out the v-shaped notch. On the front brace, carefully draw a line down the center and saw in two equal parts.

Plane the rough edges. This space is cut in this way to allow the cart to turn on a kingbolt. The hole for this bolt is bored half way between the ends with a 7/16" bit, taking care to have it go perfectly straight through the wood.

Make a piece A, which holds the handle, ⅞"x3"x4½", having the 3" dimension with the grain of the wood. The detail A, on the drawing, shows clearly how to lay out the outline which can then readily be sawed out. Bore holes where indicated for screws and bolts. This is attached to the lower half of the front brace with glue and 1¾" No. 10 round head screws.

On the bottom board of the cart, 3 7/16" from either end, square a light line from side to side. On this line bore holes with a 3/16" bit 2" from either end and others 3" from these, as shown in top view for attaching frame and braces together. Countersink these holes quite deeply to receive 1¼" No. 12 flat head screws, gluing the pieces also.

The handle is ½"x1"x30", with a hole bored in one end with a ¼" bit, where shown, in which is placed a piece of ¼" dowel, 4" long, held in place with two ⅜" brads. On the other end a hole is bored with a ¼" bit at such a place as will fit nicely with the holes bored in the handle support. Join the handle and support with a ¼"x2½" stove bolt, placing a small washer under the head of the bolt.

Use a ⅜"x4½" carriage bolt, as a king bolt to hold the cart body to front brace and allow it to turn. Place a washer between the two parts of the front brace and one under the nut head.

If a lathe is available the wheels may be easily turned from some medium hardwood such as birch or gum wood.

These are ⅞" thick and 5⅜" diameter. If these are to be cut by hand, strike a circle with dividers, 5⅜" in diameter and saw nearly to the line with a turning saw. Finish with chisel and file.

Bore holes for the screws in the center, using a bit large enough to allow the screws, which are used for the axles, to turn easily within. Start a hole in the end of the wheel braces ¾" from the lower side, so as to allow the screws to get properly started.

All parts should be carefully sanded and painted to suit taste. A varnished upper body with red wheels looks well. Apply two coats. Wheels are attached with 2½" No. 14 screws with washers under screw heads and also between wheels and brace ends.

A SCREWDRIVER

R. A. Armstrong, Aberdeen, S. D.

(See Supplement No. 42.)

The screw driver shown has been used by the writer as a machine shop project for several years and has been found very good from the standpoint of interest aroused in the pupil, utility of the finished article, and the educational value of the operations involved.

Most of the operations will be obvious to any one familiar with machine shop work. *The inside* of the piece "A" is first finished, being held in the lathe chuck. It is then brazed upon the blade "C." To do this place "A" on blade and heat slowly and evenly in a forge fire to a red heat. Place spelter or a bit of sheet brass with borax upon the blade near "A." Heat until brass melts and flows into joint. The blade may then be held in the chuck while the *outside* of "A" is finished. We have found it convenient to turn the handle in the engine lathe rather than the wood lathe, using the compound rest to turn the tapered portion. Press the handle onto the blade by use of the arbor press or tailstock of the lathe.

The end of the blade is forged to shape, ground to fit the size screw desired, annealed, hardened in oil, and the temper drawn over a gas flame to a dark blue.

When finished one should be able to twist off the head of a screw held in the vise, the screw, of course, being of the size for which the screw driver was made.

A DRESSER BOX

Everett M. Stanley, Wilby High School, Waterbury, Conn.

(See Supplement No. 43.)

This dresser box affords an opportunity for careful, accurate tool work. It is made of red cedar. The top and bottom are rabbeted and set in the dovetailed frame. The cover is hinged. The butt-hinges are so set that only the joint shows. A varnish finish rubbed to a satin smoothness is applied.

JUMPING STANDARD SUPPORT

J. A. Miller, New Kensington, Pa.

(See Supplement No. 44.)

An interesting project for advanced students in patternmaking is the support shown in the supplement.

The student must be very careful and accurate when turning the job in order to get the even thickness of ⅛". Eight sections are cut out to lighten the support, thus forming eight ribs which are strengthened by ¼" ribs running radially from the center and fastened at right angles, making a T section. The method of construction makes the entire job very rigid and minimizes the possibility of breakage while molding.

Castings made from the pattern may be added to the athletic equipment of the school.

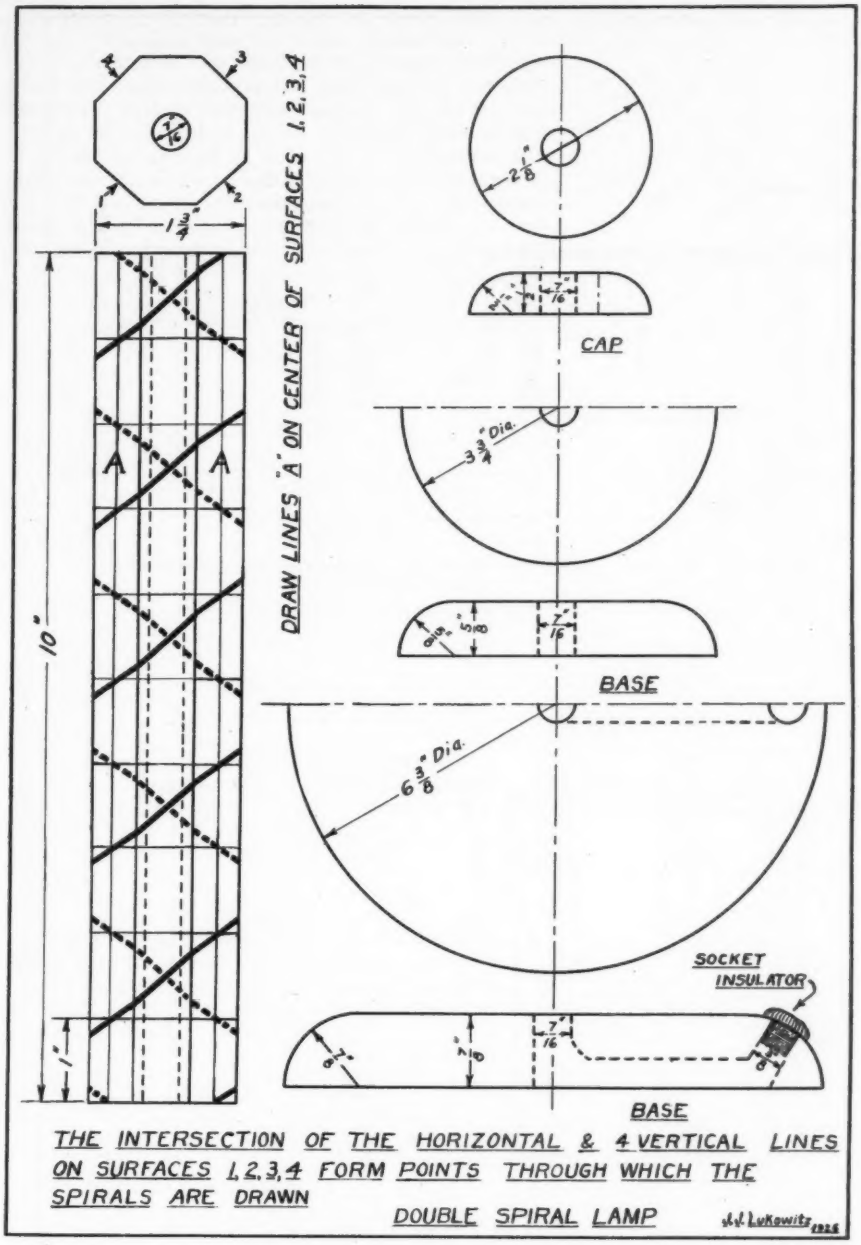
The upright (either the jumping standard or the pole vaulting standard as desired) is simply slipped into the square opening and pinned or bolted by using two ⅜" holes.

SPIRAL TABLE LAMP

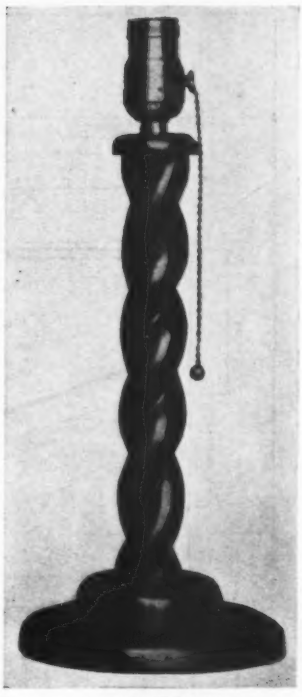
Jos. J. Lukowitz, Milwaukee, Wis.

The accompanying illustrations show one of a number of table lamps made in the author's classes by seventh and eighth grade boys. The lamps were made entirely by hand, because no lathe was available, and consequently the curve and base are rather plain. The design, however, needs no excuse, for the lamp is simple and dignified in appearance, and there is a fine contrast between the high lights and the shadows brought out by the various curves.

If a lathe is a part of the school shop equipment, the construction of the lamp shaft is easy. Instead of beginning with a hexagonal base, it is well to turn the shaft to size and then lay out the helix as explained under the construction details. The carving work may best be done by simply hold-


DRAW LINES "A" ON CENTER OF SURFACES 1, 2, 3, 4
CAP
BASE
SOCKET
INSULATOR
BASE
THE INTERSECTION OF THE HORIZONTAL & 4 VERTICAL LINES ON SURFACES 1, 2, 3, 4 FORM POINTS THROUGH WHICH THE SPIRALS ARE DRAWN
DOUBLE SPIRAL LAMP

DETAILS OF THE DOUBLE SPIRAL LAMP.



LAMP BASE.

DETAILS OF LAYOUT FOR SPIRAL OF LAMP BASE.

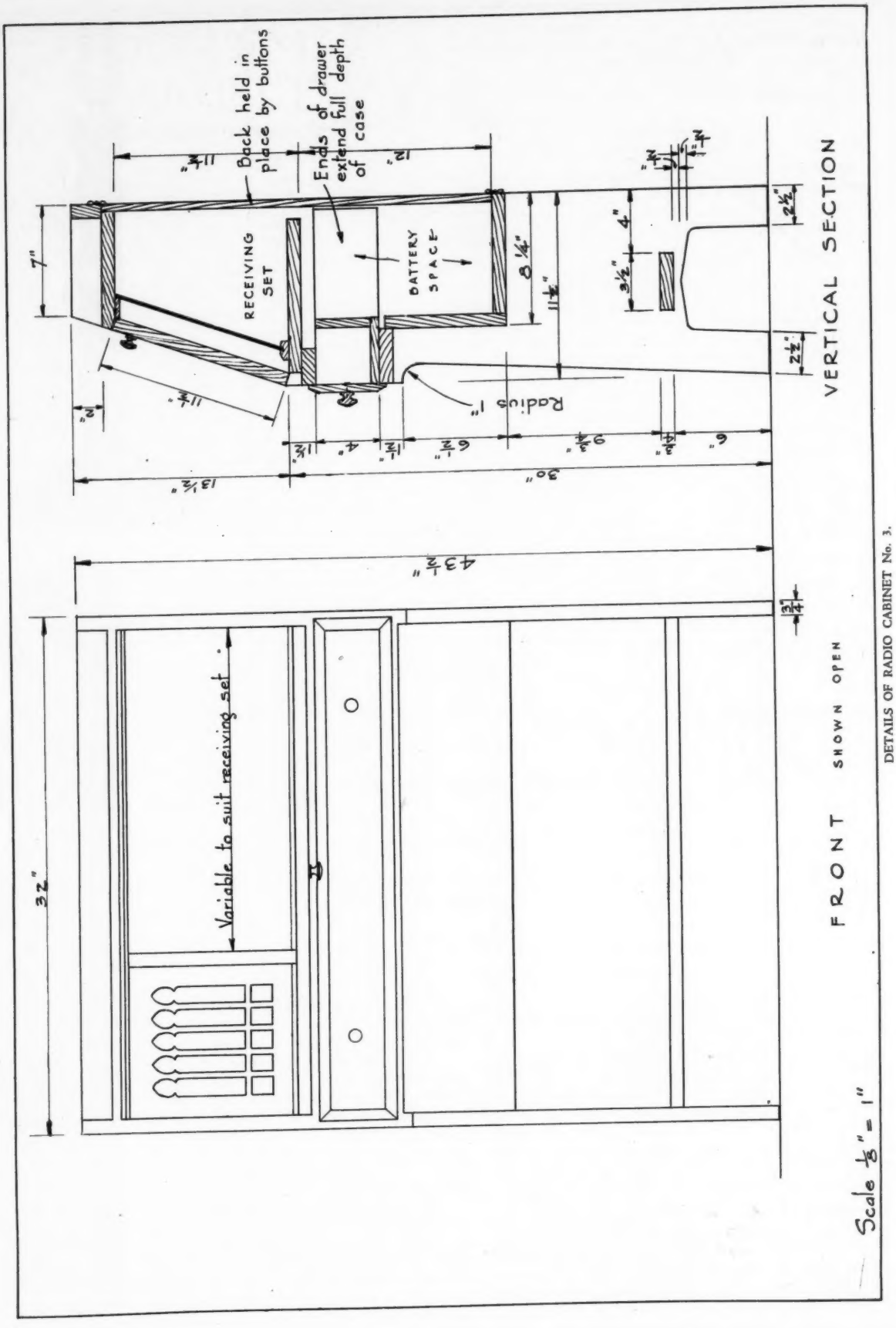
ing the shaft between the lathe centers. The ends of the shaft and the base can be greatly improved by turning pleasing profiles which are not possible with hand tools alone.

The spiral of the shaft may be adapted to table legs, candlesticks, floor lamps, smoking stands, etc. If the spiral is split, it may be applied to cabinets in various ways as pendants, columns, or appendages of various kinds. To make a split spiral, glue two pieces of stock together with fairly heavy paper between the joint. After the carving is completed, the shaft may be carefully split with a chisel—the paper will split readily and allow the parts to be separated.

Construction Details: After bringing the shaft to the size called for in the drawing, bore the hole and plane the base to the hexagonal form. Then, proceed to lay out the construction lines for the helix or spiral with a pencil and rule. See the drawing and the illustration of the partly completed model. With a back saw, saw on the helical lines along their entire length to a depth of about one-fourth inch. Then, with a good sharp chisel, begin carving toward the saw kerf. The illustration of the model shows a part of this work completed.

When the carving is done, the double spiral will take form very rapidly, but much patience and considerable skillful tool control are necessary to refine it. After the carving is done, the judicious use of a cabinet file will help greatly in removing the arrises left by the chisel. The shaping of the cap and base is comparatively simple.

In assembling the parts by eighth grade boys, a good grade of hot glue was used after the ends of the shaft had been previously glue-sized. The finish consisted of a black oil stain, two coats of shellac, and a final wax polish. The shellac was carefully sanded after each coat had dried, and the wax was polished to a soft luster.

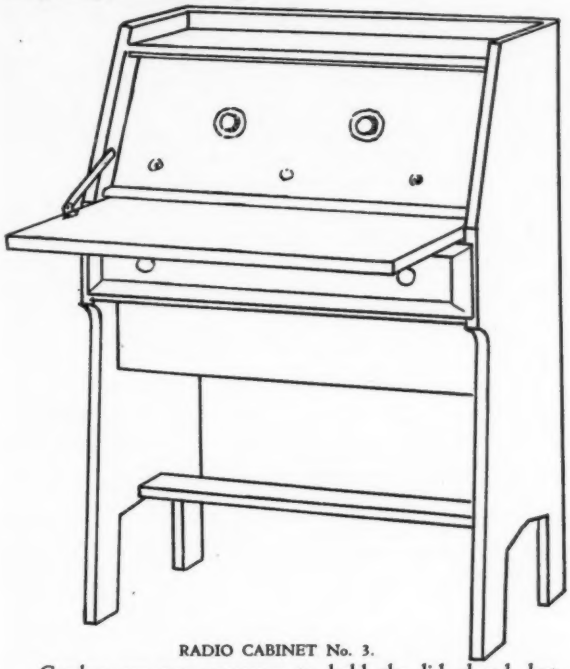


DETAILS OF RADIO CABINET No. 3.

RADIO CABINET No. 3

Gladstone Califf and Arthur Christensen

This cabinet is very simple in construction although the drawer and battery space appear complicated at first glance. The drawer is short from front to back, but the end pieces or slides are extended to prevent the drawer from cramping in opening on account of width. This arrangement leaves ample room for all batteries and they can be readily connected to the set above. The dial panel is tilted to provide maximum space for the receiving set and to please people who prefer the panel placed at an angle.



RADIO CABINET No. 3.

Catches are not necessary to hold the lid closed, but brackets must be provided for support when open.

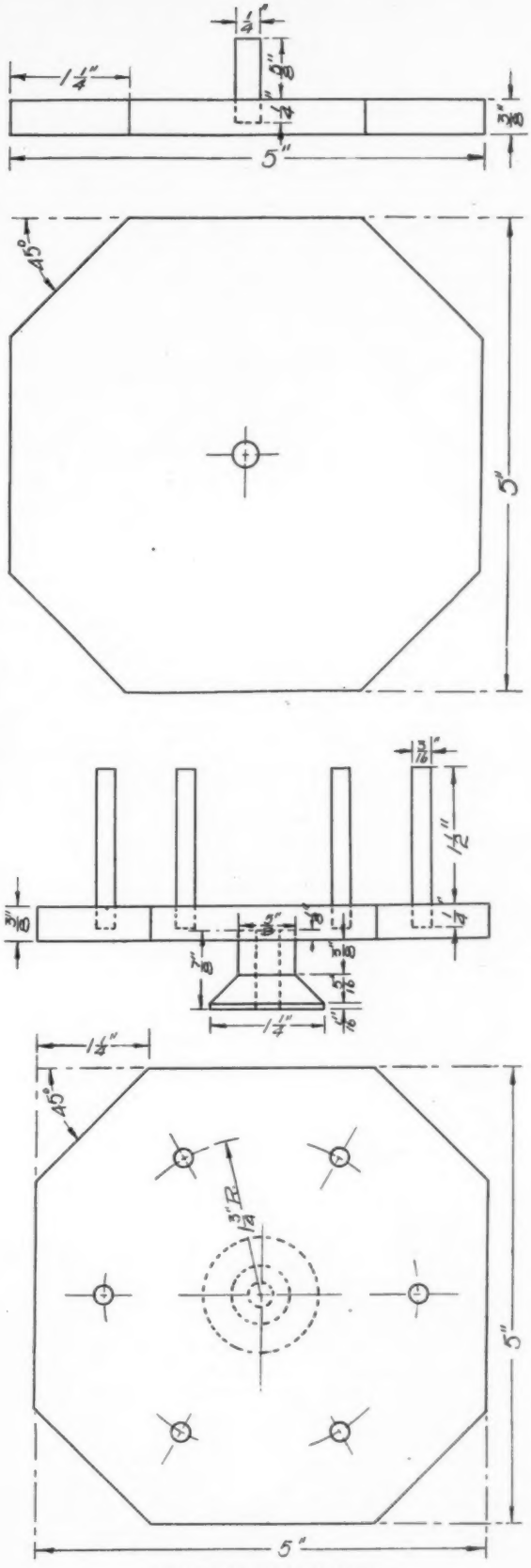
The back should be made of three-ply veneered stock in one piece. It should be removable so that the entire radio outfit is accessible.

Number Required	Size	Part
2 pc.	¾"x11½"x43½"	Ends
1 pc.	¾"x 3½"x30½"	Stretcher
2 pc.	¾"x 7½"x30½"	Battery Box
1 pc.	¾"x 3¼"x30½"	Bottom
1 pc.	¾"x 2¼"x30½"	Division
1 pc.	¾"x 9½"x30½"	Shelf
1 pc.	¾"x11½"x30½"	Drop Leaf
1 pc.	¾"x 7½"x30½"	Top
1 pc.	¾"x 2 "x30½"	Rail
1 pc.	30½"x24¼"	Veneer Panel Back
2 pc.	¾"x 4 "x11 "	Drawer Ends
1 pc.	½"x 4½"x31 "	Drawer Front
1 pc.	½"x 4 "x29 "	Drawer Bottom
1 pc.	½"x 3½"x29 "	Drawer Back
1 pc.	¾"x 9½"x10¾"	Division
1 pc.	½"x 1½"x30½"	Panel Shoe
1 pc.	½"x 1½"x30½"	Stop
1 pc.	9½"x11 "	Veneer Grille
1 pc.	11 "x20¼"	Bakelite Panel
28 pc.	¼"x 2 "	Dowel Pins
1 pr.	1½"x 1½"	Cabinet Hinges
1	Shelf Bracket	
3	Drawer Knobs	
4	Japanned Buttons	
	Nails, Screws, Silk, etc.	

A SPOOL HOLDER

A. J. Bates, Yonkers, N. Y.

This spool holder is in two parts, the dimensions of which are clearly given. It affords a splendid opportunity for the fundamental tool operations. It may be made of a hard or soft wood and stained, varnished, or enameled.

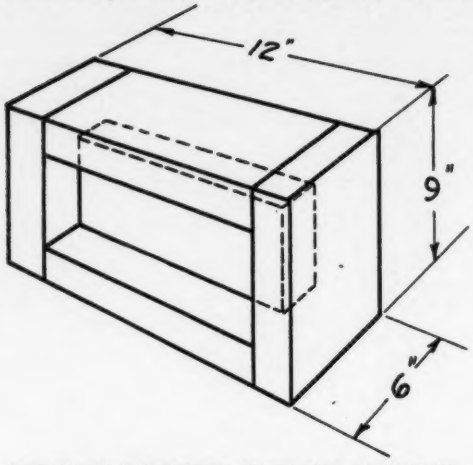


DETAILS OF SPOOL HOLDER.

SUPPORTING BLOCK FOR GARAGE USE

A. M. Hahn, Instructor in Shop Work, Millikin University, Decatur, Ill.

The accompanying sketch shows one of a pair of blocks which are handy in any shop, and especially in the school garage. Almost anything, usually of the wrong height and unsafe, is used to hold up a car when the jack is needed elsewhere. One of these blocks, built up as shown, gives a solid, safe support of three dimensions.



DETAILS OF SUPPORTING BLOCK FOR GARAGE USE.

BATH TUB SOAP TRAY

J. W. Bollinger, Theodore Roosevelt Jr. High School, Tulsa, Oklahoma

This bath tub soap tray is a simple problem, easy to make, and should help fill a need for elementary sheet metal problems.

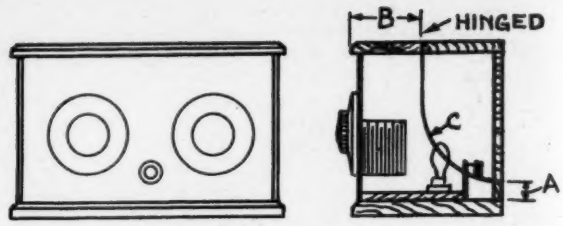
It is suggested that the problem be introduced to the pupils in the form of a mechanical drawing, permitting the pupils to work out the pattern themselves. Note that the corners slant, with the exception of the back, which rests directly against the tub, and is at right angles to the bottom. There are no laps, and so there is no soldering or riveting. The back is wired with a separate short piece of No. 13 wire. The front and sides are held by a continuous piece of wire, as per drawing. The wire can be shaped to fit the tub, after being put into place. It is advisable to give the finished problem a coat of white enamel.

A RADIO BOX KINK

Carl H. Oquist, School No. 10, Mt. Vernon, N. Y.

The work of attaching the antenna, ground and battery wires has always been more or less of a bother due to the fact that there is usually such a limited space in which to make necessary connections. With a slight change in design both the tubes and the various terminals may be made very accessible.

The back is made in two pieces, the narrowest, A, being made wide enough to come approximately one-quarter of an inch below the binding posts. For the sake of strength in part A, the binding post panel should be at least 1½" wide. A, the binding post panel should be at least 1½" wide. Dimension B should be about 2½" or greater, allowance being made for the easy removal of the tubes nearest the panel.



DETAILS OF RADIO BOX KINK.

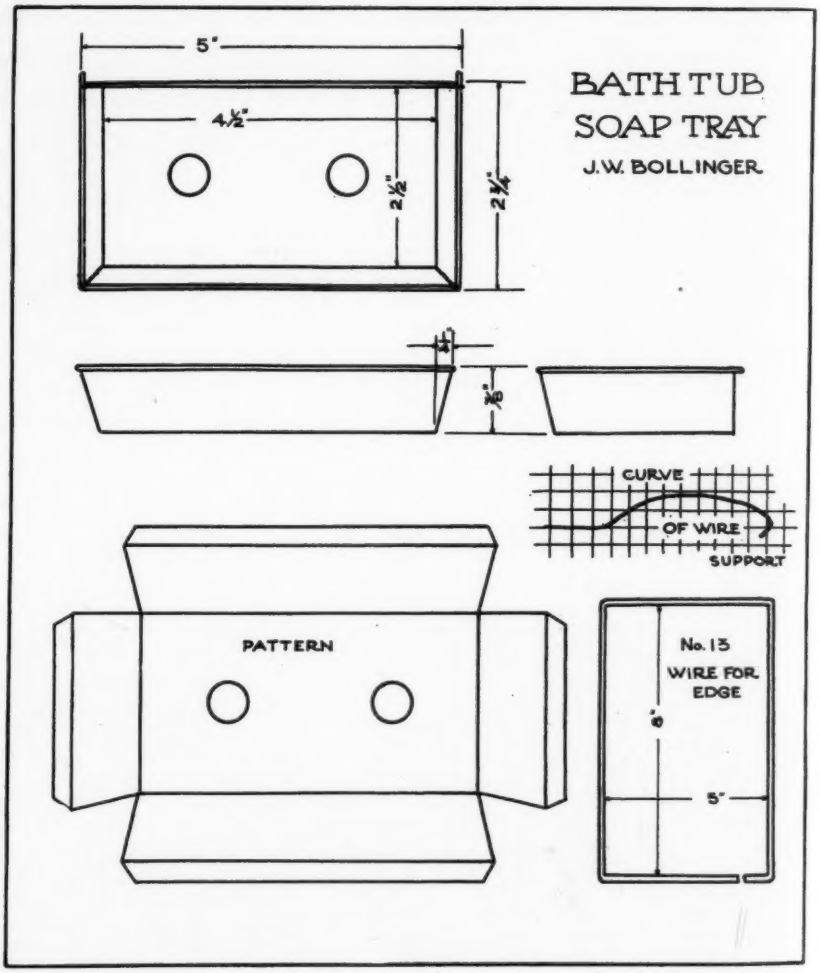
After dimensions A and B are known, the curved line C may be drawn and then cut with either the coping or band saw. The back section is hinged as indicated.

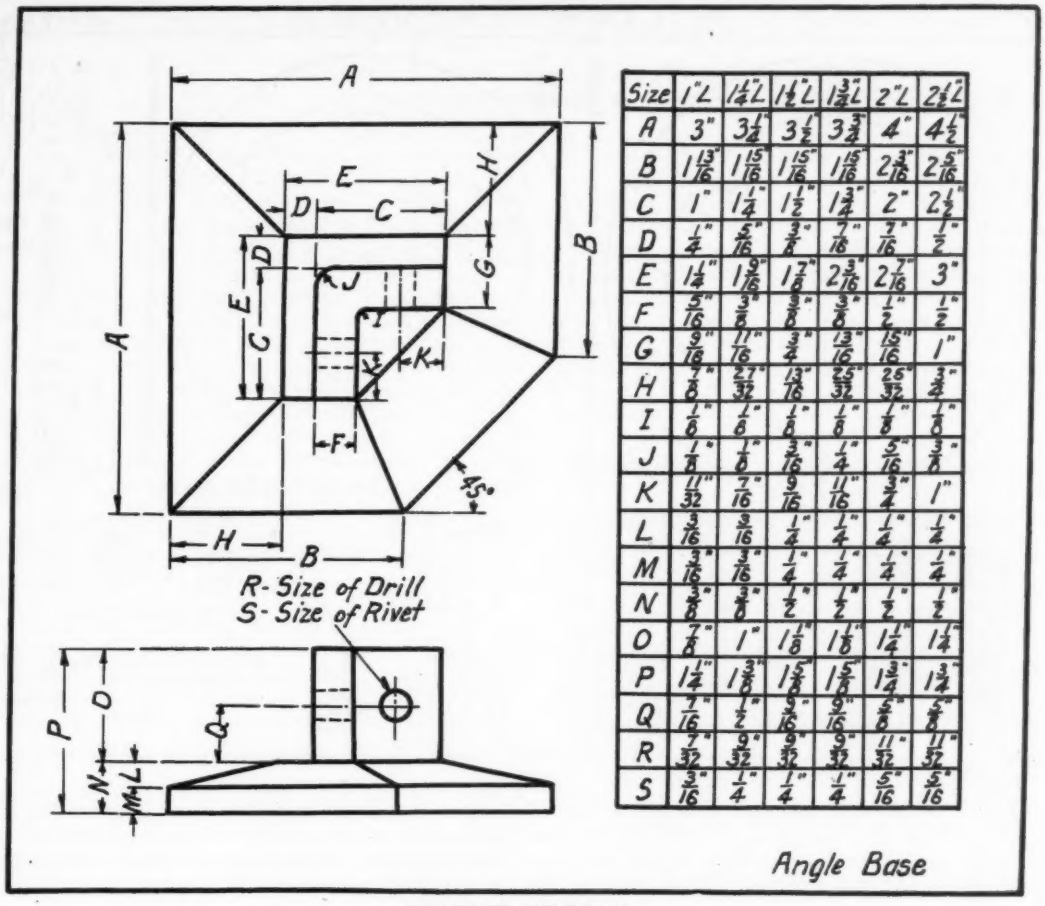
A CHIPPING-AND-FILING PROJECT

J. A. Miller, New Kensington, Pa.

The instructor in machine shop practice very often is uncertain as to the type of work that should be given to the beginning class. Particularly is this true when it is necessary to provide a portion of the class with a chipping and filing project.

Some teachers have the habit—and it's a bad habit—of selecting a piece of steel or cast iron from the scrap box and giving it to the student with instructions to "Square it up,"





Size	1"L	1¼"L	1½"L	1¾"L	2"L	2½"L
A	3"	3¼"	3½"	3¾"	4"	4½"
B	1 13/16"	1 15/16"	1 15/16"	1 15/16"	2 3/16"	2 5/16"
C	1"	1¼"	1½"	1¾"	2"	2½"
D	1/4"	5/16"	3/8"	7/16"	7/16"	1/2"
E	1¼"	1 9/16"	1 7/8"	2 3/16"	2 7/16"	3"
F	5/16"	3/8"	3/8"	3/8"	1/2"	1/2"
G	9/16"	11/16"	3/4"	13/16"	15/16"	1"
H	7/8"	27/32"	13/16"	25/32"	25/32"	3/4"
I	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
J	1/8"	1/8"	3/16"	1/4"	5/16"	3/8"
K	11/32"	7/16"	9/16"	11/16"	3/4"	1"
L	3/16"	3/16"	1/4"	1/4"	1/4"	1/4"
M	3/16"	3/16"	1/4"	1/4"	1/4"	1/4"
N	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"
O	7/8"	1"	1 1/8"	1 1/8"	1 1/4"	1 1/4"
P	1 1/4"	1 3/8"	1 5/8"	1 5/8"	1 3/4"	1 3/4"
Q	7/16"	1/2"	9/16"	9/16"	5/8"	5/8"
R	7/32"	9/32"	9/32"	9/32"	11/32"	11/32"
S	3/16"	1/4"	1/4"	1/4"	5/16"	5/16"

DETAILS OF ANGLE BASE.

"Chip a 45 degree angle," "File it smooth," "Work on it until I return," etc. What happens after the instructions have been carried out? Invariably it is thrown back into the scrap box, there to await the efforts of another future machinist.

This practice is wrong. Not only does the student lose interest in his work, but he also loses confidence in the teacher's ability.

A much better procedure for the teacher would be to select some project that doesn't need to be thrown away, even if the student's experience with this work is such that the job at completion doesn't quite measure up to the standard.

It would be a good idea to select a project that can be put to some practical use in the shop where the student can see and appreciate the value of the work he has done.

The angle base shown in the drawing is an example of this kind of project. It is fastened to a piece of angle iron to form supports or legs for tables, stands, benches, etc., used in the shop. The angle portion of the base should be the same dimensions on the outside as the angle on the inside, and at the bottom enough flat should be provided to suit the thickest angle in the respective sizes.

The table shows the sizes for the different angles.

This project gives the first steps in chipping and filing to size, and yet is not too difficult for the beginner to handle. It makes a nice project for the beginner in patternmaking and is fine for teaching the value of handbooks and composite drawings in the drafting room.

DIMENSIONING DRAWINGS

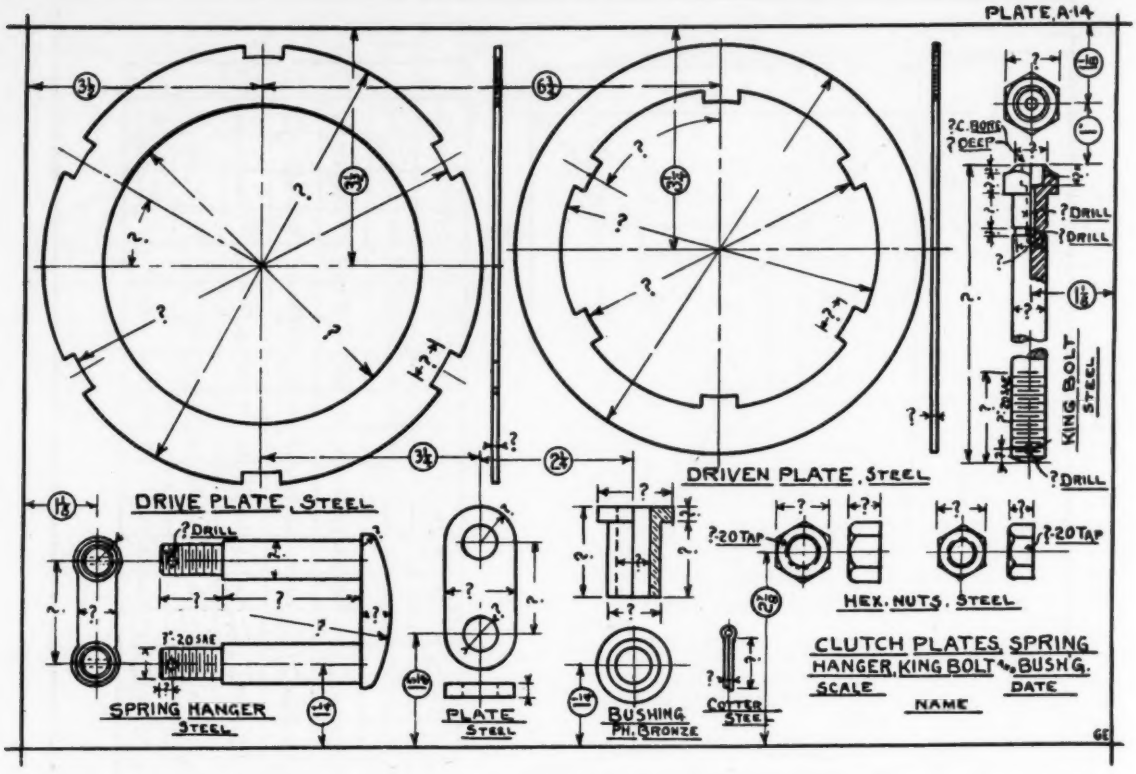
George Elleson, Milwaukee, Wis.

One of the most trying and difficult problems an instructor in mechanical drawing has to contend with is trying to get his students to properly dimension a working drawing. I know the libraries are full of books on mechanical drawing and they all make an attempt at teaching dimensioning, but seeing there is no standard system for dimensioning, it usually devolves upon the instructor to coach the student in this part of his drawing. I have tried several methods of dimensioning, such as having all the information on the specification print and the entire process is one of simple copying. The average student does not become interested in such problems and very seldom concentrates upon the location of the dimensions.

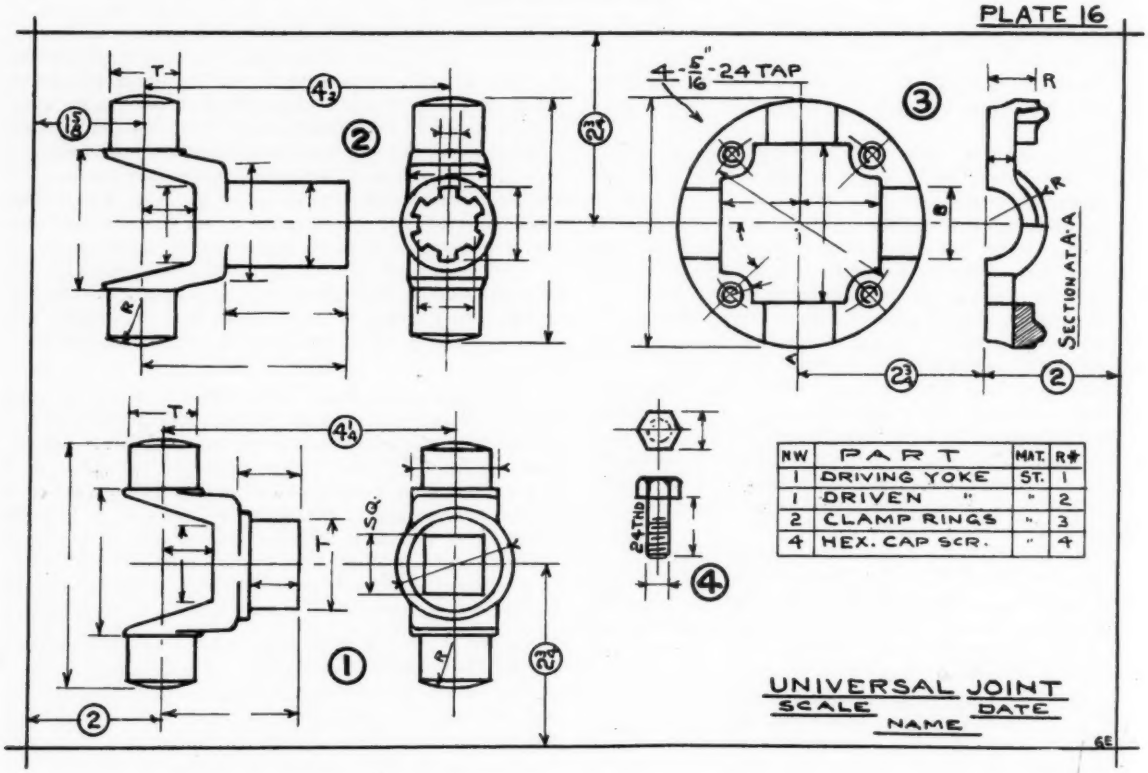
I have worked out several specifications which I find make the student think about what he is doing. The accompanying two drawings of the problems have been successfully used in teaching mechanical drawing to an auto mechanics class.

The idea is as follows: A complete sketch of all parts is given; all necessary views are drawn in their proper positions; and all necessary dimension lines are indicated, but the dimensions are omitted. The student is handed the actual piece of machinery he is to draw, told to arrange his views as shown on the print, which is not drawn to scale, so as to avoid copying sizes, and he is obliged to measure the piece in order to insert the dimensions in their proper places. By this method he is required to examine every dimension location. He can readily see just why every dimension called for is necessary.

I find the boy is interested in what he is doing, because he understands what he is making a drawing of. Too many times a student is required to make a drawing, with all views and trimmings, of some object he has never seen, and which perhaps does not pertain to any shop work he is doing and then we wonder why he is not interested in drawing.



It will be noticed that both these problems are worked up from actual automobile details and the boy appreciates the fact that he has a correct detail working of some part of a real machine. If the teacher wishes to further draw out the individual idea of the student, he can request him to make an assembly of the universal joint, placing only such general dimensions upon his drawing as are usually given on drawings of that kind.



NO.	PART	MAT.	R#
1	DRIVING YOKE	ST.	1
1	DRIVEN "	"	2
2	CLAMP RINGS	"	3
4	HEX. CAP SCR.	"	4

HOLIDAY PROJECTS

William V. Winslow, Supervisor of Art Education,
North Tonawanda, N. Y.

The accompanying designs represent the work of sixth and seventh grade children. The calendar and card were made in the classroom during school time as a part of the regular instruction in art and industrial arts. Neither design is a copy although the boys and girls had reference material about their rooms as they worked.

In September the children of grades five, six, and seven were given lessons in the painting of trees and landscape in black on manila and white paper, occasionally using color. Later object drawing took the form of representing houses and barns and these forms were later introduced into the landscapes. The best landscapes, the work of each child, were preserved, cut down to pleasing composition, and mounted. From these landscapes representing the best work of each pupil, the designs for the calendar and card were chosen.

When the teacher and supervisor had decided upon the most satisfactory designs they were sent to the printer who secured the zinc etchings to be used later in the process of printing.

The calendar landscape is the work of a sixth grade boy; the lettering is the work of the class, all letters being made in one-fourth inch squares, cut out, and painted black. The lettering was spaced and pasted on a card by two pupils. Afterward the lettering was sent to the printer who had the entire card reduced to the required size and a cut made for printing.

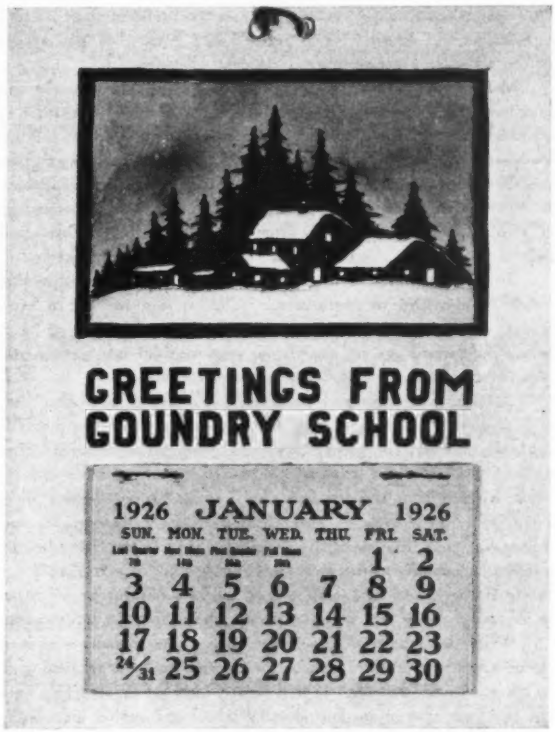
The card landscape represents the work of a seventh grade girl; the lettering in this case was supplied by the printer. When completed the card is enclosed in an envelope to match. The cards are printed on white paper while a variety of colored cards are used in the printing of the calendar.

The printing being done, the children of the entire class were put to work coloring the card and calendar respectively. The work is simpler than at first appears to be the case. The transparent water colors may be painted over the printer's ink with no trouble whatever. Where white is used on some of the darker calendar mounts, the pigment must be used with care or be wiped off where it shows over the printer's ink. Some of the more expert pupils may work on the darker mounts which necessitates the use of white.

TYPICAL GREETING CARD.

The children color the cards complete. There is no division of labor since that would make the cards appear too mechanical. Each pupil works on five or six cards or mounts at a time as this involves less trouble in the mixing of colors. For example, a pupil will paint in the sky of all cards first, then the ground on all, and then the windows.

Aside from the standpoint of careful drawing the children learn considerable about the printing industry, and also about the various kinds of paper. Where time allows, the manufacture of paper may well be studied or undertaken in this connection. In addition, the children learn something of the problems of the printer, such as composition, proportion, and reducing. They know a zinc etching and are interested to know how it is made. They learn something about costs and about figuring profits. They know the comparative costs of calendar pads, mounts, printing, cord for hanging calendars, envelopes. When the proceeds are in their own labor of coloring, marketing, etc., they can be computed.



A COMPLETED CALENDAR.

In the Goundry school, North Tonawanda, where the designs were made, the proceeds from their sale were used for the support of a Near East orphan which the school had adopted. Three other schools carried on work of a similar nature, all realizing a substantial profit on their holiday cards. In all instances the cards and calendars sold for five cents each and practically all were disposed of in three days' time.

The pupils were enthusiastic in making and selling the greetings and the money will be used for a worthy purpose. The teachers who undertook the work feel that it was very much worth while.

Evidence is to be found on every hand that the public has come to the conviction that art is not one of the fads but that it is essential in the cultivation of good taste and pleasurable surroundings. The graceful lines of the latest model of automobile, simple and well designed furniture, tasteful home decoration, clothes of suitable texture and color, posters, well designed hardware, and the innumerable items that enter into our everyday life all indicate the real and practical expressions of art.

SCHOOL CRAFTS CLUB, NEW YORK CITY

Members of the School Crafts Club were accorded a treat at the November meeting, held at the Geneva Restaurant on November 20th. Three of the wise men in the eastern field of industrial arts were present and spoke. They were Lewis A. Wilson, Wesley O'Leary, and Frank E. Mathewson. Mr. Wilson is Director of Vocational and Extension Education for the State of New York. Mr. O'Leary is Assistant Commissioner of Education in charge of Vocational and Continuation Education for the State of New Jersey. Mr. Mathewson has charge of industrial arts in secondary education for Jersey City, N. J. Two new members were received into the School Crafts Club: John W. Seeley, Union City, N. J., and Herbert E. Hartley, Newark, N. J.

Mr. Wilson followed as a topic "Present Day Policies in Industrial and Technical Education." After raising a laugh at the expense of a Chinese statesman, Mr. Wilson brought out factors which influence our policies. We are in a rapidly changing industrial and social world. Seventeen years have been added to the average age since 1900—seven years to children and ten years to adults through progress in medicine and surgery. This factor has a bearing on the amount we can allow for expenditure in developing education.

Mr. Wilson showed how immigration had brought about a situation which influences our policy. Between 1890 and 1915 an unlimited supply of craftsmen came from eastern Europe and the Mediterranean countries. Now about 70 per cent of immigrants are unskilled farm and industrial laborers and 30 per cent are illiterate.

The immigration quotas were fixed according to the percentages of 1890. This has brought a large percentage of immigrants from Ireland, British Isles, Germany, and France into the night schools.

The average number of children in families is growing smaller. Families can afford to spend more. Children are entitled to better homes, clothing, and education. There was no responsibility taken before the present age for the 90 per cent who did not finish school. Now we have training and follow up work for them.

In regard to vocational guidance, Mr. Wilson feels that there is a danger of it being a kind of paper guidance in the hands of academic teachers. A prescription is no good unless it can be filled. So it is with vocational guidance. There are many factors in industry which reading alone will not answer. In a certain pressfeeders' union there are 5,500 members. These men all thought they would get a chance for promotion to cylinder pressmen. However, many are not intelligent enough and the promotion rate is low. There is an opportunity for industrial arts men to give concrete information in regard to necessary ability and training, besides the chance for advancement.

When day industrial schools were started the students were made up of educational misfits, with boys who were not making good grade in the elementary schools. If it is only a question of discipline, often the boy finds interest in the industrial school and applies himself; but if he does not have intelligence, he continues to be a misfit. Industrial schools in New York started in abandoned school buildings, but today they have reached a point where scores of new buildings are being built to house them. Buffalo, N. Y., has new buildings and at present has a $500,000 metal trades school under construction. The progress in Buffalo is due to a carefully organized selling plan to the public.

Placement and follow up work are necessary factors. Employers are fair, and unfair, to employees. The right thing is to start boys in the fair company. There is a growing demand for apprentices who have finished a trade school. Boys are placed before graduation. There is room for advancement in technical day schools, with only 41,000 children out of 2,600,000 in secondary education.

Mr. Wilson discussed such factors as part-time education, apprenticeship, and night schools. He feels that it is impossible for cities under 50,000 to support part-time and evening instruction. As a solution for this problem the New Jersey county vocational schools are a fine example of organization. Technical training for junior engineering positions, such as laboratory assistants, is well covered by the Dickinson High School type of technical high schools.

The topic of Mr. Wesley O'Leary was "Some Recent Tendencies in Education and Their Significance for Industrial Arts." Mr. O'Leary gave some interesting figures as to the economic value of the children of New Jersey. It costs $9,333 to bring a boy up to the age of 18 years. In an article written for Harper's by an insurance statistician the economic value of an 18-year-old boy is given as $29,000; at birth, $9,000; at age 15, $25,000, with a decrease towards later life until at the age 70 the economic value falls to a minus value.

Between the ages 14 to 17, about 200,000 boys and girls in New Jersey leave school each year. Their present economic worth figures at more than $5,000,000,000. This is more than New Jersey's total industrial output of $4,000,000,000. Schools are turning out an economic product of more value than the total industrial product, and each teacher has a responsibility in training this great output.

The great aim of education today is not to get together facts, because there are too many today for one person to know everything. It is not to train the mind. We are set down in a civilization with things which make for comfort and happiness. Others are coming here to live and do things. It is the duty of the schools to train for better things in respect to family, community, and the world's work. This is one phase of the background for vocational training.

Teachers must realize their own potential energy. The state can offer opportunities for extra training. Most vocational and continuation school teachers are in improvement classes. Counties are being organized to do the same for industrial arts teachers.

Mr. O'Leary spoke in regard to the county vocational school organization, as the way out for the smaller places, since they could not support individually, industrial schools with a variety of courses. He feels that employers are not taking enough responsibility upon themselves in the support of industrial schools. They should help in organization to develop an efficient type of work in our schools.

Mr. O'Leary pictured the situation during the war when even old shoes were salvaged and how Germans wore shoes made from ground paper and old bits of leather. This was to illustrate that even though children in continuation schools are felt by many to be a waste product, nevertheless they are much more worth while salvaging than other things where even greater effort is expended. The personnel of continuation schools must have a vision as to the development of boys and girls.

Mr. O'Leary referred to the policy which underlies the aims for industrial arts which Mr. Robert Campbell, assistant in charge of Industrial Arts, is setting forth in his contact with teachers throughout the state. This policy is to have industrial arts teachers broaden their teaching to develop a wider conception of the industries of today.

Mr. Frank E. Matthewson remarked that a club of this kind was excellent in that it got together men of similar interests, where each could learn what the other fellow is doing. There are other associations which industrial arts men should join and become active members in. One of these is the Eastern Arts Association with an enrollment of 1,500 teachers. Last year a wonderful convention was held at Syracuse—the best in the history of Eastern Arts. From April 20 to 24 the next convention is to be held in Philadelphia.

Mr. Mathewson elaborated on the subject of boys who have reached the saturation point as far as straight academic training goes. Technical courses often open the door to new interests with chances for mental and vocational expansion.

The next regular meeting of the School Crafts Club will be held off until the third Saturday evening in January, 1927.

LLOYD F. STAIR.

Vocational Courses for Credits. Twenty South Texas public schools have arranged for courses in retail merchandising, the classes to carry high school credit but to be conducted under the auspices of the United Merchants Association. Smith-Hughes instructors are in charge of ten courses each at Del Rio, Sabinal, Uvalde, Eagle Pass, Crystal City, Asherton, Carrizo Springs, Dilley, Pearsall, Kerrville, Fredericksburg, New Braunfels, Seguin, Karnes City, and Kennedy.

Wins First Place in Contest. Esperanza Reyes, a pupil in the junior schools of San Antonio, won first place in the national poster contest conducted by the American Humane Association. Two other students in the art department won honorable mention.

THE FIRST MEETING OF THE AMERICAN VOCATIONAL ASSOCIATION AT LOUISVILLE

It is estimated that more than a thousand educators met in Louisville, Kentucky, December 2, 3, 4, for the first meeting of the American Vocational Association.

The atmosphere of the convention was filled with the cooperative spirit existing between industry and schools. There was a generous sprinkling of industrial representatives and a large portion of the general and sectional meetings were devoted to industry or industrial conditions. In fact the entire convention was arranged around the worker, stress being placed upon his placement, entrance into industry or training after his regular day school had ended. The keynote of this movement was struck by Dr. Prosser in his suggestion that a committee be appointed to promote adult education.

The outstanding changes or additions to the policies of the two parent associations—(The National Society for Vocational Education and The Vocational Society of the Middle West) were embodied in the report of the resolutions committee, of which Howard L. Briggs of Cleveland was chairman, and are as follows:

1. A committee on adult education to cooperate with all other organizations, committees and individuals in constructive work in this field.

2. A committee to act as a coordinating agency in the promotion of a scientific study of teacher-training problems and to devise ways and means of determining, collecting and distributing research material vital to the success of the vocational education movement.

3. A committee to determine ways and means of inducing a greater number of industrial and building trades representatives to attend the next convention.

4. That the executive committee of the next convention be instructed to include a manual arts program.

5. That steps be taken to increase the amount of money available in home economics through legislation or by any other means in order that (a) the present staff available for service to the states may be enlarged; and (b) the funds which can be used in the state may be increased.

Two new members were named on the executive committee, one representing home economics and the other commercial education. Those named were Miss Genevieve Fisher, University of Pittsburgh, and Mr. C. D. Slinker, director of business education, Des Moines, Iowa.

This brief report will cover the high lights of the general meetings and a few of the sectional meetings. Space will not permit a detailed treatment of any part of the program.

General Meetings

The first general meeting of the A. V. A. was addressed by Mr. McHenry Rhodes, superintendent of public instruction of Kentucky, who welcomed the convention to Kentucky in a manner befitting the spirit of true southern hospitality.

Dr. Charles A. Prosser, speaking on "Adult Education" made a direct appeal for more consideration for that vast army of workers out of school. "It is our job to make articulate the hopes, aspirations and dreams of those who work with their hands," he declared. "Democracy, itself, is in proportion to the equality of opportunity for all, and the classics do not function. Democracy demands intelligent fellowship as well as leadership." He said that understanding, sympathy, adaptability, and flexibility were needed and pleaded with the Directors present to go back to their respective cities and think more about this problem of adult education. Dr. Prosser stated that if our country would spend 1/100th as much on developing its human resources as it spends on developing its natural resources, we would be much farther advanced.

John F. Case, editor of the Missouri Ruralist and President of the Missouri State Board of Agriculture spoke on the subject, "The Influence of Vocational Education Upon Rural Life." He called attention to the significance of selling farm life, on the importance of its job.

The second general meeting was addressed by John F. Tigert, commissioner of education of the United States, and by Miss Elizabeth Fish, Minneapolis, Minn.

Mr. Tigert told his audience that the forces of education at Washington were working toward the development of factors of efficiency. He called attention to the program of economy which our government has adopted and assured everyone that this policy was felt in the educational field. "This retrenchment of the operations of the federal board has not lessened the service of the bureau, but has resulted in the same service at a smaller cost through the application of efficiency methods," he said.

Miss Fish, talking on "Armistice Day for Vocational Education," declared that truly an armistice between industry and the schools has been declared. "This has taken many years and has been signed by the change in sentiment, which is everywhere apparent," she said.

The Banquet

The banquet was capably addressed by Mrs. Lillian M. Gilbreth, Montclair, N. J., and by Mr. Arthur S. Somers, member of the Board of Education, New York City.

Mrs. Gilbreth gave a stirring address replete with helpful information for vocational education and guidance in industry. She brought a message which should be a source of a great deal of thought for those present at the banquet. "The gospel of work, and leisure as a recreative period in preparation for work, should be stressed," she said. "Industry needs the help of vocational teachers, cooperation will assist all." Mrs. Gilbreth outlined types of study to promote education in industry as:

1. Motion study, where careful observing will discover the engineering mind, where likenesses as well as differences are taught.

2. Skill study, where the best one can do is stressed. This study is divided into classes having no coordination, correlation, and individual initiative.

3. Fatigue study, where the elements entering into physical and mental fatigue are studied. At this point the following statement was made for industry:

"There isn't one type of work for which a cheap, useful chair cannot be devised."

4. Selection of the worker, where cooperation with schools is necessary and psychological tests play a part. "The success of these tests depends upon the personality of the psychologist," Mrs. Gilbreth pointed out.

5. Promotion is a serious fault of industry and may be overcome by job analysis to some extent. To quote: "Exploitation of labor is a terrific waste."

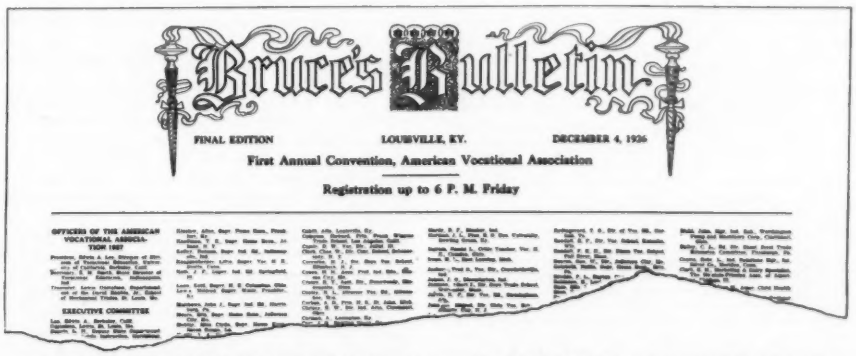
Mr. Somers, in speaking as an employer and school board member said, "The will to work is rewarded. The child should attach himself to something worthwhile. Labor wants more pay and less work, while capital wants to give worth for worth. The indifference to obligation on the part of labor is evident. We should hold to the old tradition of the spiritual in place of modern materialism, which is the job of both home and school. The vocational expenditure is the very best investment if the future welfare of our country is to be preserved. The dignity of labor should be stressed, relating your work to the cultural things of life, which will teach to spend wisely in days of shorter hours and more money."

Sectional Meeting Briefs

The following are a few of the significant statements made in some of the sectional meetings.

Mr. E. M. Walsh, educational director of international master painters and decorators, said: "Taxpayers should not pay for the tremendous loss of people turned out into industry unprepared." He strongly advocated the cooperation of industry and schools for recognition of the building trades.

The vocational guidance meetings brought out the fact that too much stress should not be placed upon intelligence tests alone. These should be supplemented by achievement tests. Dr. Ryan of Swarthmore College said, "Scholastic capabilities can be measured much


Bruce's Bulletin

FINAL EDITION LOUISVILLE, KY. DECEMBER 4, 1926

First Annual Convention, American Vocational Association

Registration up to 6 P. M. Friday

OFFICERS OF THE AMERICAN VOCATIONAL ASSOCIATION 1927

EXECUTIVE COMMITTEE

THE LIST OF PERSONS IN ATTENDANCE AT THE CONVENTION WAS IMPRESSIVE OF THE IMPORTANCE OF THE MEN AND WOMEN PRESENT.

easier than vocational, and that mechanical aptitude tests are usable but by no means final."

Charles A. Wardner, Jackson, Michigan, addressed his audience on "Vocational Guidance in the Small Community," and advocated surveys, occupational information classes, motion pictures and assembly talks.

Miss Mary P. Coire, Cincinnati, Ohio, spoke on "Vocational Guidance in a Large City System," and advocated a special bureau to collect and edit material on the industries. She pointed out that this material should always take into consideration the changing conditions of the times.

Mr. O. H. Day, Kansas City, Missouri, addressed his audience on the "Case System." "Each child is an individual case to be handled separately and differently from all others," he said.

Mr. Vierling Kersey, Los Angeles, Calif., gave a helpful talk on placement and follow-up of students entering employment. The placement bureau; classification according to physical and emotional qualifications; and placement according to adaptability, attitudes, and habits were stressed. Mr. Kersey advocated a tie-up of the boy or girl with some school influence and regular visits, pamphlets or leaflets to the young worker on the job in the hope of advancing his or her education.

Professor George E. Myers, University of Michigan, discussed the subject, "Tentative Standards of Judging a Comprehensive Guidance Plan." He covered this subjejct under four headings,—completeness, distribution of emphasis, thoroughness of each activity, and set-up or organization.

Dr. Prosser discussed the subject, "The Future of the Continuation School." He told his audience that the future is what they make it, results count most. The attitude of the boy has to be taken into consideration. An appeal must be made to his interests and what he can use must be given.

Dr. William T. Bawden, Tulsa, Oklahoma, gave a humorous talk on "The Guidance Values of the Manual Arts" at the Industrial Education Dinner Conference. "Cooperation is needed in all agencies for success, standardized tests have been slow to develop, for the American spirit will not stand for pigeon-holing young people," he said. Among other values of the Manual Arts pointed out by Mr. Bawden are,—it helps an individual to find himself, completes the development of the boy, and offers opportunities to try out experiences gained in other classes.

The Draft of the Ship

This summary of the A. V. A. would not be complete without a word about the 46 companies exhibiting machines, books, periodicals, and supplies at the convention. Each year their presence is noticed more and this year one was forced to make his call upon each and every one if he wished to be considered for the prizes. Upon registration, each person was given a card to be punched in a certain place by each company representative, who was located by number. When it was discovered that each punch was different and that there was no regular order of the exhibitors, it was necessary to have an audience with each before his punch was secured. It was a lot of fun and an enlightenment on what our friends had to offer at the same time.

When the awards were made by Mr. Frank K. Phillips, Captain of "The Ship" it was not uncommon to see a married man receive a box of candy to carry home to his wife, shop teachers receive cook books and even an author received a square and level to guide his future steps. One fellow was presented with a wall safe but the question arises, "What of value does a school man have to place in a safe?" "The Ship" as usual "put into port" and delivered its cargo creating humorous situations to cheer all present.

Annual Business Meeting

The first meeting of the House of Delegates of the A. V. A. assembled and accepted the reports of the various committees.

Mr. Edwin A. Lee of the University of California was reelected President, Mr. Lewis Gustafson, President of the David Rankin Junior School of Mechanical Trades was reelected Treasurer, and Mr. Z. M. Smith of Indianapolis, Indiana, continued in the office of Secretary.

At a regular meeting of the Executive Committee, Los Angeles, California, was chosen as the meeting place for the 1927 Convention.

The Resolutions

The resolutions adopted by the convention includes statements reaffirming the former stand of the older organizations on the department of vocational education in the fields of agriculture, industry, home making, and commercial subjects. They express thanks to the Louisville authorities, to the Department of Superintendence, for their cooperation, and to the exhibitors. Among the other important resolutions are the following establishing special committees:

Be It Resolved, that the President of the American Vocational Association be instructed to appoint a committee of five persons to act as a coordinating agency in the promotion of a scientific study of Vocational teacher-training problems and to devise ways and means of determining, collecting and distributing research material vital to the success of the Vocational Education movement.

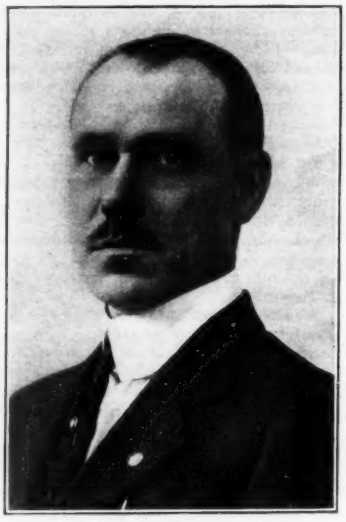
Be It Resolved, that the President of the American Vocational Association be instructed to appoint a committee of five to determine ways and means of inducing a greater number of industrial and building trades representatives to attend the next Convention.

Be It Resolved, that steps be taken to increase the amount of money available in Home Economics through legislation or by any other means in order that (1) the present staff available for service to the States may be enlarged, and (2) the funds which can be used in the State may be increased.

ILLINOIS SOCIETY ORGANIZES

A most successful convention of vocational and industrial arts men was held in Chicago, November 26th to 27th. The meeting constituted the organization meeting of the Illinois Society for Vocational Education and Practical Arts Education. The new group combines the former Illinois Manual Arts Association and those strong forces which formed the backbone of the Vocational Education Association of the Middle West.

Among the speakers on the general program were Dr. L. W. Smith of the Joliet Township High School, Mr. W. E. Roberts, supervisor of manual arts, Cleveland, and Dr. E. T. Filbey, of the University of Chicago, Mr. Lewis Gustafson, of St. Louis, and Prof.



URBAN G. WILLIS,
Principal of the Pullman School,
Chicago, Ill.

A. W. Nolan, of the University of Illinois. The banquet was addressed by Asst. Supt. W. J. Bogan of the Chicago schools, Mr. Edwin A. Lee, president of the American Vocational Association, and Mr. Henry Turner Bailey, of the Cleveland School of Art.

Round tables were held for the discussion of problems of part-time education, vocational guidance, industrial relations, commercial education, art instruction, home making, printshop work, and industrial education.

The new organization is a component branch of the American Vocational Association. The officers for 1927 are:

President, Urban G. Willis; vice-presidents, A. W. Nolan, Harriet M. Cantrall, Marguerite Higgins, Frances Swain, N. F. Fultz, Thomas Bjorge, C. A. Gilkerson; secretary, L. Day Perry; treasurer, L. P. Elliott.

Board of Directors: L. W. Smith, C. A. Bennett, J. F. Kolb, L. W. Wahlstrom, A. B. Mays, and A. W. Evans.

Executive Committee: A. B. Mays, N. F. Fultz, Marguerite Higgins, Frances Swain, and C. A. Gilkerson.

VOCATIONAL EDUCATION SOCIETY OF BOSTON

The November meeting of the Vocational Education Society of Boston was held at Hotel Westminster, Copley Square, on Saturday, November 13th, with President Robert E. Baker presiding.

Mr. Leander S. Harding, Industrial Education Adviser of the Associated Industries of Massachusetts, spoke on the subject, "Industry's Interest in Vocational Education." To many of the members Mr. Harding was no stranger, since his work had brought him into intimate contact with apprenticeship classes conducted in various vocational schools.

"New England industry," said Mr. Harding, "is inevitably interested in vocational education, since it depends to so large an extent upon superior workmanship for its prosperity. Of natural resources and advantages, Massachusetts possesses few if any. Its industrial life is based upon the skill of its workers rather than upon any gifts of nature. The fostering of this skill becomes therefore a matter of prime importance."

Every industry is faced with two problems in relation to its employees: Their selection, and their training for the work which they are to perform. To the solution of the first problem, the public schools can do a great deal. One of the aims of any school system is to prepare its pupils for the livelihood side of life. In recent years much has been done along the lines of vocational guidance. A great deal of this guidance, however, is negative in character; and in the opinion of Mr. Harding it must remain so. We can discover rather adequately the limitations of a given individual, give him valid advice

as to what occupations he is not fitted for. It is not so easy to select a type of work and tell a pupil that this and no other is the proper work for him. Almost any human being possesses so many capacities that there remains, after the wisest guidance, a choice which he must make for himself; accidentally if not deliberately.

One phase of the work, however, which is commonly included under the term "vocational guidance," might well be emphasized far more than it is, and should be extended to schools which do not go in for guidance in any formal way. This phase is the giving of vocational information. A part of every curriculum should be the study and interpretation of the industrial and occupational life of the community, leading to an insight, superficial though it might be, into the essential features of the various "jobs" in one of which the individual is likely to find his eventual place. Cities and towns having a dominant industry—as is the textile industry in many Massachusetts places—should certainly see to it that the dominant industry is made a subject of study in the schools. By the law of averages, a large proportion of the youngsters in such towns will find their way into this industry. This informational aim would not exhaust itself in classroom discussion and lecture alone. Prevocational shopwork and much of manual training may be used to give adequate impressions of some of the types of work which contribute to the community's life.

But beyond all such training rises the second problem: The training of workers or embryo workers for specific types of jobs. Into this field enters the vocational school. Its aim includes the imparting of some minimum of real skill to the learner. Its task is at once more restricted and more serious.

Mr. Harding quoted from a report of the Federal Board for Vocational Education to the effect that "no school can be the full equivalent of apprenticeship. It can turn out advanced apprentices, but not journeymen." In voicing his agreement with this statement, Mr. Harding referred to the type of work frequently done by young apprentices in industry—a type of work, by the way, which has been frequently criticized. The apprentice during his first few months is likely to be kept upon such work as running errands, or doing other jobs which require little skill and contribute directly not at all to the acquisition of trade technique. The purpose of such assignments of apprentices, said Mr. Harding, is to give him the "run of the shop"; to let him absorb the shop atmosphere, terminology, and other intangible things in a better way than he could absorb them if his attention were focused on a job of greater direct educative value. It is precisely this atmosphere which the school can not impart. The school can, however, give such a groundwork of training as to make this "errand boy" phase unnecessary when the lad goes into the shop. How much more training it can effectively give, depends upon the aim of the school and its efficiency in achieving that aim. To the point to which the school can give trade training, it can probably give it more economically than industry can.

Mr. Harding described briefly the "apprenticeship" training which the Associated Industries has tried out on college men. He emphasized the thought that the colleges, as well as the schools, might very profitably give vocational information as a part of every college course, and thus save their graduates from time-wasting and disillusioning experiences in the process of becoming adjusted to the industrial world.

In conclusion, Mr. Harding decried the tendency of encouraging boys to defer their vocational choice. He advocated allowing and encouraging them to choose as soon as they are individually ready. In some cases the boy at 12 is not too young to adopt a definite vocational goal. In other cases he may not be ready until he is 18; perhaps he never will be ready for a deliberate choice. But allowing for individual differences, we should encourage the selection of a vocation at the earliest possible time. Any other course will only serve to widen the gap between "school life" and "real life," and make the adjustment difficult when it comes.

The status of the continuation school and the attitude of the manufacturers toward the proposed change in the continuation school law was discussed.

President Baker called upon Mr. J. Grosvenor Plowman, industrial relations adviser of the Associated Industries, for a brief talk. Outlining briefly the work which is his province, Mr. Plowman described it as a threefold problem dealing with the elimination of unemployment; first, unemployment through no fault of the worker (as in the case of an industrial depression or "lay-off"); second, through the worker's fault, as, lack of ability or training; third, through disability caused by accident, illness, and so forth. In all three phases the effort, said Mr. Plowman, is to emphasize prevention rather than temporary cure. The second phase is one in which the vocational programs of the schools are involved.

At the business meetings, President Baker read a letter of resignation from Edward R. King of New Bedford, who after thirty-one years' continuous membership in the society, is retiring as supervisor of manual training in the New Bedford schools. It was unanimously voted to enroll Mr. King as an honorary member for life.

Frederick Ames Coates.

THE IOWA CONFERENCE AT IOWA STATE COLLEGE

The Iowa vocational conference was held October 11th to 13th at Iowa State College, Ames, Ia. Sessions were held for those interested in vocational agriculture, home making, trade and industrial work.

The general topic for discussion was "Apprentice Training." Mr. C. F. Klinefelter, of the Federal Board for Vocational Education, talked on "Apprentice Training." He touched briefly on the progress made in the solution of the problem of training apprentices to fill the demands of the skilled trades, and told how the different states are attempting to meet the problem. Mr. H. L. Freeland, supervisor of trade and industrial education in Kansas, talked on the need and importance of apprentice training both to the employer and the workers in the trades. Dr. C. A. Prosser of Dunwoody Institute, spoke on "Vocational Education" at the general session, pointing to the need of making a true profession of teaching. Mr. Laurence Parker, teacher-trainer in industrial education in Kansas, discussed the subject, "Apprenticeship Training in Kansas," and described the work as it is carried on in Kansas.

Dr. C. A. Prosser, who addressed the general session speaking on the subject, "The Use of Science in Education," compared manufacturers with schoolmen, urging that educators give more attention to the raw material. Many pupils, he said, are below the average in mental ability and the problem is to teach habits and principles.

Mr. Martin of the C. M. & St. P. Railroad, in his talk, touched briefly on the system of apprenticeship in use by this railroad. Intensified training, he said, creates a closer relationship between the employer and employee, as the latter desires to fit the position available in order to avoid leaving the company's employ. Mr. C. M. Miller told of the experiments of the M. K. & T. railroad in testing apprentices, and the results were said to agree with the company's experience with apprentices. The Soo railroad will not hire an apprentice until he has completed his preliminary training at Dunwoody Institute.

Mr. H. A. Frommelt, the next speaker, classified apprenticeship plans of former times, and pointed out that the problem today is something to be taught, something to teach, and someone to teach it. The next step in the program is to obtain a qualified man, who will come into the community and work full time in carrying out the work.

TEXAS ASSOCIATION HOLDS ANNUAL MEETING

The Texas State Teachers' Association closed its annual three-day session on November 27, the meeting this year being held at El Paso. Items of interest to practical arts people from the general program were addresses by Loredo Taft, Dr. E. P. Cubberley, Pres. P. W. Horn, Texas Technological College, Pres. S. H. Whitley, and Dr. M. J. Mayo, St. Louis.

One day was devoted to various sectional meetings, which included art, vocational agriculture, commerce, home economics, industrial arts, and vocational teachers. The Industrial Arts Section met in the auditorium of the new El Paso Vocational School and was presided over by Director E. C. Rakestraw. The official program follows: At the morning session Supt. A. H. Huey spoke on "El Paso's Vocational Education Plan," and Hartman Dignowity of Fort Worth, talked on "Organizing Day-Trade Classes in a Small Community."

In the absence of Regional Agent J. M. Hall, the topic of cooperative Part-Time Classes was covered by general discussion. Prof. Firm explained the shop systems organized at the Texas A. and M. College. At the afternoon session, "The Effect of the Veto of State Aid for Trade and Industrial Education," was discussed by Miss Laura Murray, Director Industrial Teacher Training, University of Texas. The subject, "How Can Teachers' Colleges Best Meet the Demand for Qualified Industrial Arts Teachers?" was taken by Mr. Victor J. Smith, State Teachers' College, Alpine. "What the A. and M. College Can Do to Train Teachers for the Manual Arts," was discussed by Mr. E. L. Williams of the A. and M. College.

Following the sectional meeting, over a hundred members adjourned to Juarez, Mexico, where a Mexican banquet was served.

During the business session steps were taken to revise the State Association's constitution to conform more closely to the National Society. The name Texas Vocational Association was adopted. One hundred fifty members were reported in good standing with the possibility of enrolling many more of the 600 in Texas.

Officers for the next year were elected as follows: President, C. L. Davis, Vocational Agriculture, Austin; Vice-President, Miss Mabel McMaines, Home Economics, Houston; 2nd Vice-President, W. C. Holland, South Park.

Officers for the Industrial Arts and Vocational Section are: Chairman, Victor J. Smith, State Teachers' College, Alpine; Vice-President and Secretary, G. B. Trimble, Vocational School, Ft. Worth.

NATIONAL VOCATIONAL GUIDANCE MEETING

The National Vocational Guidance Association will hold a meeting preceding the Department of Superintendence convention, February 24th to 26th at Dallas, Tex. The headquarters of the association will be at the Adolphus Hotel.

Information concerning the meeting may be obtained by writing to the chairman of the program committee, Dr. Iva L. Peters, Syracuse University, Syracuse, N. Y.

NOW, ARE THERE ANY QUESTIONS?

Heat and Fuel Values of Wood

Q. 632. One of my boys in shop is lumbering a two-acre tract of land for firewood. He would like to know the relative values of the different trees for fuel. They are Oak, Locust, Cedar, Chestnut, and Cherry.—W.C.R.

A.: Complete information about the relative fuel values of various common woods in the United States may be found in Technical Note No. 98 of the United States Forest Products Laboratory, Madison, Wisconsin, and in Bulletin 753 of the United States Department of Agriculture entitled "The Use of Wood for Fuel," obtainable also from the Forest Products Laboratory, Madison, or from the Government Printing Office, Washington, D. C. (10 cents).

In considering the fuel value of wood, it is necessary to remember that while two varieties may yield exactly the same amount of heat, their fuel value may be quite different. A wood which burns rapidly and gives an intensely hot fire may be good to use in the summer time for cooking, while another wood which burns slowly but with less intense heat will be far more useful for heating a room in the winter time. Thus, birch is used in certain sections in the winter for heating because it burns slowly, and aspen is used in the summer for cooking because it produces a quick, hot fire.

From the standpoint of heating value one cord of oak and locust has a value of one ton of coal. On the other hand, two cords of cedar are the equivalent of one ton of coal. The following extract from Table 8 in Bulletin 753 is interesting:

Species	Available heat units per cord of 90 solid cubic feet (in millions B.t.u.) Air-Dry	Green	Per cent of short ton coal value Air-Dry	Green
Cherry, black (P. serotina)	18.5	17.3	71	67
Wild red (P. pennsylvanica)	14.2	13.5	55	52
Chestnut (C. dentata)	15.6	12.9	60	50
Locust, black (R. pseudacacia)	26.5	25.4	102	98
Honey (G. triacanthos)	24.5	22.5	94	87
Oak, White (Q. alba)	23.9	22.4	92	86
Cedar, White (T. occidentilis)	11.3	10.7	43	41

Antique Lacquer Effects

Q. 634. Please give me the necessary steps to take in securing antique effects, that is, the shading from greens and reds into browns, with the new Oriental lacquer finishes. Please let me know also if these finishes can be used satisfactorily over unfilled newly surfaced wood. If a filler or undercoat is desirable, what should I use?—H.L.W.

A.: It is only possible to secure the new antique effects through shaded lacquers by the use of the air gun fitted with a special nozzle for touch-up and shading work. So far this has not been satisfactorily accomplished by brushing. In case of woods to be lacquered, requiring filling, the latter should be made on a silex base with all oil replaced by varnish and Japan drier, allowing at least 48 hours to insure complete hardening of the filler in the base of the pores. In the finish which you mention the wood is to be stained brown; lacquered; filled and dried, relacquered; high-lighted with reds and greens through the use of the touch-up gun; allowed to dry over night and then rubbed for finish with FFF pumice stone, crude oil and felt pad, and finally wiped clean with soft rags.—Ralph G. Waring.

THE CONSTRUCTION OF A HOME BY A HIGH SCHOOL CARPENTRY CLASS

C. M. Helwig, Monessen, Pa.

The boys in the house building department of the high school at Monessen, Pa., have adopted the slogan, "Build for the future," and another, "A house each year should create no fear."

Last year eight boys of the vocational department under the direction of the instructor in carpentry, built a modern six-room house.

This year a group of twelve boys decided to repeat the experiment and set as their aim, a finer and better structure, in which someone might enjoy the comforts of a home through the efforts of a dozen students.

HOUSE BUILT BY BOYS OF THE CARPENTRY CLASS AT THE HIGH SCHOOL, MONESSEN, PA.

The structure shown in the photograph was built by eight boys during the last school year. The boys comprised three senior students and five juniors, none of whom had had any previous experience in house building, with the exception of work done in the school shop. All the carpentry was done by the boys, without any outside assistance except from Mr. Edward Ciriacy, the carpentry instructor, who acted as foreman during the construction.

The house has six rooms, a cellar and an attic. The foundation walls are concrete blocks. Electric wiring and installation of fixtures was done by the boys in the electrical department under the direction of the instructor in electrical wiring and testing. The dining and living rooms have hardwood floors.

In addition to the carpentry work, the boys of the department carried out the greater part of the excavation, and did all the painting, staining, varnishing, and roofing work. The masonry, plumbing, heating, plastering, and papering was accomplished by outside workmen on a contract basis.

The sturdiness of the house has developed a sense of confidence in the ability to keep in step with the carpentry work at the close of the school training. It also involved a measure of patience and co-operation with their co-workers, which has established a stabilizing effect in their training as future builders. The carpentry course is arranged on a three-year basis and is conducted three hours each day on the operative plan.

SHOP TEACHER'S CALENDAR

Tasks for January Shop Management—Close the first semester's work and check the progress made. Make reports to the superintendent of failures, material made up and sold, equipment made for the shop, and financial returns. Put the second semester's schedule in operation. Start list of tools and equipment needed. Call teachers' meetings to discuss problems and projects for the semester. Inspect classes to see that the work is up to the standard.

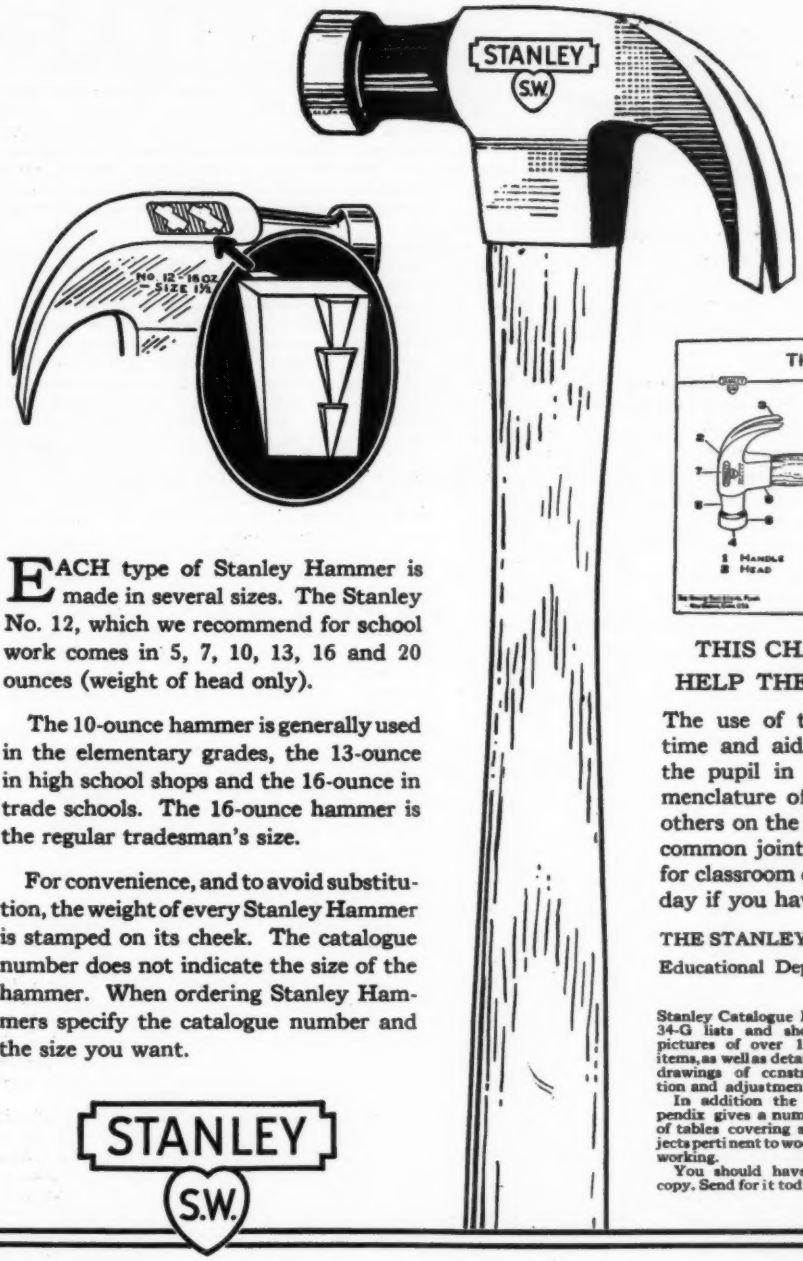
Instruction—Give vocational talks on the making of the proper shop selection. Encourage the use of the school library. Organize snow shoe clubs.

Problems—Arrange for late winter projects such as skiis, toboggans, snow shoes, etc. See that the birdhouse projects are in progress for the early spring opening.

Community Service—Cooperate with local agencies in making articles for community use.

Are your Hammers of correct weight?

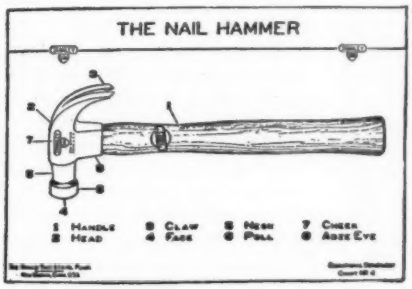
The weight of each STANLEY HAMMER *is stamped on the cheek*



EACH type of Stanley Hammer is made in several sizes. The Stanley No. 12, which we recommend for school work comes in 5, 7, 10, 13, 16 and 20 ounces (weight of head only).

The 10-ounce hammer is generally used in the elementary grades, the 13-ounce in high school shops and the 16-ounce in trade schools. The 16-ounce hammer is the regular tradesman's size.

For convenience, and to avoid substitution, the weight of every Stanley Hammer is stamped on its cheek. The catalogue number does not indicate the size of the hammer. When ordering Stanley Hammers specify the catalogue number and the size you want.



THIS CHART WAS MADE TO HELP THE BUSY INSTRUCTOR

The use of the above chart will save time and aid materially in instructing the pupil in the construction and nomenclature of the tool. This chart and others on the plane, chisel, screw driver, common joints, try square, etc., are free for classroom display. Send for them today if you have not been supplied.

THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

Stanley Catalogue No. 34-G lists and shows pictures of over 1500 items, as well as detailed drawings of construction and adjustment.

In addition the appendix gives a number of tables covering subjects pertinent to woodworking.

You should have a copy. Send for it today.

STANLEY
S.W.

STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

Industrial Education Mag.—December—1 page
Industrial Arts Mag. —December—1 page
P. O. 2094 ★

26-210

See the Point?

Some people think the point of a drill is the extreme tip of the cutting end!

Actually, that extreme tip is known as the "Dead Center"—while "The Point" is the *entire* cone-shaped surface at the cutting end. All that you see in the illustration above is "The Point."

This is only one of the many interesting and instructive definitions to be found in the Handbook for Drillers. In it every part of a twist drill is clearly and simply described—plus a great deal of useful information on grinding, cutting speeds, feeds and how to secure the best results when drilling in various metals.

Vocational Directors and Instructors are invited to ask for copies of the Handbook, in any reasonable quantities, for the use of their machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ezy-Out" Screw Extractor.

NEWS NOTES

Apprentice Classes. The apprentices in bricklaying at the Tenth Street Center, Los Angeles, Calif., have completed their first two-story project. The brick construction used afforded an unusual lesson in view of the fact that it was the first building to be constructed in which the California bond was used. Another new bond, used in Italy, has been studied and is being taught to apprentices in both day classes and journeymen in evening classes.

Certificates of Craftsmanship Awarded. At a dinner meeting held October 21st, in the Poor Richard Club, Philadelphia, Pa., the Philadelphia Building Congress made its second annual award of certificates to encourage and preserve the spirit of craftsmanship. Craftsmanship certificates were given to 63 individuals and firms in recognition of their skill, patience and toil in the community.

Certificates as "guildsmen" were awarded to twelve men engaged in the crafts, having shown skill in developing the artistry or handicraft possibilities in their particular field of work, such as designing, laying off, modeling, carving, and wrought-work. Certificates as "master craftsmen" were awarded to those having designed, specified and supervised buildings successfully erected, and who have shown a knowledge of appropriateness of design with the most advantageous use of materials.

A certificate as a "cooperating master craftsman" was awarded to those who have satisfactorily erected buildings or other structures, or installed equipment, and who have encouraged pride of craft on the part of co-workers and given individual recognition of it.

A certificate as "craftsman" was awarded to those designated as mechanics, artisans, skilled workers, etc., in any building craft having shown skill, ability, or efficiency in improving their knowledge and technique as well as that of fellow workers, helpers, or apprentices.

A certificate of "junior craftsman" was awarded to those designated as apprentices, learners, etc., who, having completed their terms, indicate the characteristics described in the paragraph relating to craftsmen.

Teaching the Use of the Electric Switchboard. Mr. J. C. Miller, of the Crane Technical High School, Chicago, has produced a device for teaching the use of the switchboard. It is the basis of a laboratory manual and the pupil completes such wiring on the panel as will familiarize him with the switchboard. When the pupil has proven that he knows exactly what to do when drawing current from the board, he is permitted to work from the panel.

Experiments are given to the class by the instructor and the underlying principles explained while seated. Notes are taken in class by the pupils, after which they are taken to the switchboard room, where the experiment is performed before the class by the instructor. Later the experiment is performed by the students working in groups of two or three as required.

The room in which eleven switchboards are installed is used in rotation by all the fourth year classes. Each class spends two of the eight weekly shop periods in the room, the periods coming at the same time each week as arranged on the program.

Electrical experiments are given weekly and written reports are prepared on the same one week later, attention being given to neatness, promptness and character of descriptive matter used in the writeup. The papers are later returned to the students with comments by the instructor at the regular marking periods.

Under the plan, the first half of the fourth year is given to direct current studies, with the second half devoted to alternating current. Reports of experiments are made on specially prepared forms, and each experiment covers four pages.

Suggestion Brings Practical Results. The leading article in the October issue of the Industrial Arts Magazine, "Locating Difficulties in the Learning Process in Practical Arts Education," by Robert Woellner, so forcefully impressed San Diego's city supervisor, P. H. Heron, that he made this matter the subject of his address at the regular monthly meeting of the technical arts teachers of the city held Wednesday, October 20th.

He carefully explained the system, its purpose and method. He had previously had the "Individual Analysis Sheet" for teachers of mechanical drawing, reprinted and distributed among the teachers so that they might follow it as he explained the system. The plan was enthusiastically received and similar analysis sheets for the other trades are now in preparation.

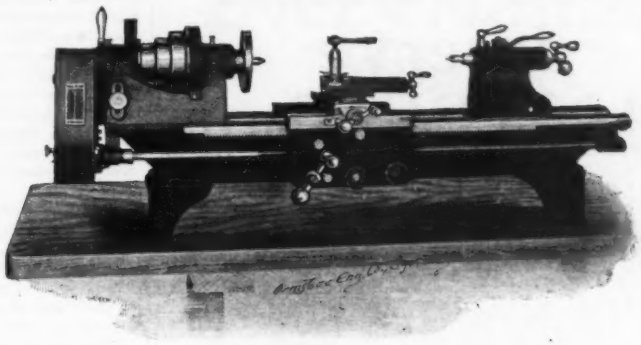
Superintendent John William Cooper also addressed the teachers. He pointed out the fact that the school shops are a great social leveler and are helping to overcome the modern tendency toward the stratification of society into classes. The tendency of modern methods in technical education is toward general knowledge, he said. Trade skill is also important but is secondary to the fundamental knowledge, for methods may change, but the underlying principles remain the same and if these are thoroughly understood, the student can adapt himself to the changes in methods as they occur.

The meeting was held in the Memorial Junior High School under the auspices of the technical teachers of that building, Ralph R. Troge presiding. A social half hour followed the program at which time the technical men of Memorial served generous refreshments to their guests.

(Continued on Page 28a)

STAR LATHES

USED THE WORLD OVER



STAR LATHES

IN OVER 400 SCHOOLS

TRAINING the BOYS for the SHOP

Note the convenience of using the bench type lathe, plenty table space for work and tools, saving of floor space, storage space under the table and a drawer for tools, etc.

STAR LATHES

BENCH TYPE
10" Swing, 4 to 5 foot Bed
12" Swing, 4 to 7 foot Bed

FLOOR TYPE
10" Swing, 4 to 5 foot Bed
12" Swing, 4 to 7 foot Bed
14" Swing, 5 to 10 foot Bed

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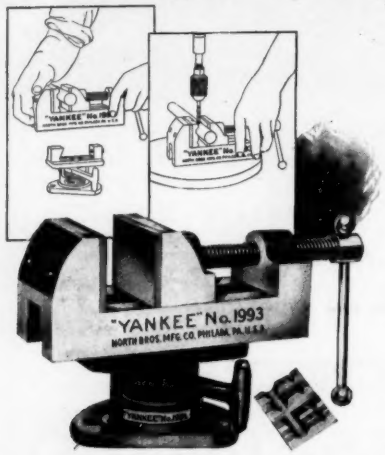
The Seneca Falls Machine Co.

SENECA FALLS, NEW YORK.

Good Schools deserve "YANKEE" Tools



The body of the "Yankee" Vise, with the work in it, is carried to the drill press. Hardened steel block, with V-shaped grooves, holds round or irregular shapes.

This means Accuracy and Faster Work

You buy and use "Yankee" Tools because they are different—and will work in ways and places in which no other tools will work.

The "Yankee" Vise is detachable from its base.

Sides, end, top and bottom, and the sliding jaw, are accurately machined to hold work square—with vise flat, on sides, or on end.

For many operations the "Yankee" Vise can be used as a jig. From machine to machine it goes—the work kept in original alignment. You can get the size most convenient for your work.

No. 1994—Jaws open 4 in.
No. 1993—Jaws open 3⅛ in.
No. 1992—Jaws open 1 15/16 in.
No. 1991—Jaws open 1½ in.

The "Yankee" Vise has swivel base. Cam-throw lever locks vise in any position.

Some other "Yankee" Tools

Plain Screw-drivers
Ratchet Screw-Drivers
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Ratchet Breast Drills
Automatic Push Drills
Automatic Feed Bench Drills
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Ratchet Tap Wrenches
Vises, Removable Base

Dealers Everywhere Sell "Yankee" Tools.

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability.

Write for Free "Yankee" Tool Book

This interesting little book is for all lovers of fine tools. It tells just what you want to know about all the famous "Yankee" Tools for making work easier and quicker.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Continued from Page 26a)

Masonry Apprentices Attend Evening Classes. During the past year a special effort was made to develop a program of evening school instruction for masonry apprentices at Albany, N. Y. The work was begun with the cooperation of the Albany builders' exchange and the Albany Local No. 6 of the bricklayers' and plasterers' union. The attendance of thirty indentured apprentices was made compulsory by the union and the various employers.

The classes were in session two hours on two evenings of each week from October to May. The time devoted to instruction was divided between practical masonry and related theory and the apprentices were placed in classes on the basis of the length of time spent at the trade.

The Kansas Vocational Association has been formed with A. L. Berry of Shawnee as president and E. H. Teagarden of Nickerson as secretary.

The Training of Bricklayers in the colored industrial high school of Memphis, Tenn., was protested by the local bricklayers' union. Supt. R. L. Jones told the delegation that it was not intended to turn out full fledged bricklayers, but to better enable them to become apprentices.

Industrial Arts Course. A course in industrial arts for California elementary schools was recently completed. The work was begun at the request of Mamie B. Lang, former state commissioner of education, who had given much attention to the work. It is called every-day art and applies directly to art problems, involving costume design, house furnishing, ground improvement, and handwork of all kinds.

The course is divided into two sections: Lower grades, and upper grades. In both sections, the work is arranged by months. The lower grade work stresses correlation, observance of holidays, room decoration, freehand drawing, modeling, and handwork. The upper grade lessons are practical and helpful. The boys' work includes drawing, lettering, map work, and craft problems, and the girls' work comprises color lessons, design, poster work, freehand drawing, cutting, and craft problems.

Class in Home Decoration. The class in home decoration at the Bronx evening high school, New York City, has started on its term's work. In addition to novelty work, opportunity is given for fine needlework in the making and decorating of pillow covers, towels, table linens, bureau scarfs, etc. Rug crocheting and decoration of table and bed linen are also part of the work. Later on, work of a more difficult nature will be attempted in the making of trays, gift boxes, and similar articles.

A class in poster design has been organized as one phase of the work. Attention will be given not only to the subject matter but also to the layout, the lettering, and the technical methods of carrying out these designs when put to use as show cards, street car advertisements, etc.

The work in domestic science is similar to that of former years. Special study is given to the preparation of jellies, preserves, and jams. A study of dietetics is an important part of the term's work.

Prize Poster Contest. Under the auspices of the Near East Relief, junior and senior high school students will participate in a poster contest depicting the work being carried out by the organization in Armenia, Syria, and other Asiatic countries.

Through the aid of Hon. Henry Morganthau, the organization is offering $1,000 in prizes—three national prizes and one for the best poster submitted in each state. Motifs for the poster may be taken from any source and all posters must be in the hands of the poster committee by March 15th. Mr. Everett Cortright of New York University is chairman of the committee, and Mr. Forest Grant, New York City, is a member.

Two-Year Vocational Courses. Figures compiled by the administration department of the Birmingham, Ala., schools show that more than 300 students in the Phillips high school receive vocational training, and a large number receive minor credits in either vocational or manual training subjects.

Two-year courses are offered in the high schools, with classes in printing, woodwork, electricity, mechanical drawing, sheet metal work, forging, foundry work, wood turning, and automobile mechanics.

All machinery used in the shops, with the exception of the heavy pieces, is made by the students in the foundry shop. The machinery and tools are made on a productive basis similar to that in the local shops.

The vocational department aims to train industrially as well as academically, and at the end of a two-year course, most shops consider the students qualified to assume responsible positions. Many of the students go on to college, taking such advanced courses as will fit them for experts in their chosen lines.

New Vocational Courses for Men. Two vocational courses in automobile salesmanship and foreman training are offered at Akron, Ohio, through the cooperation of the State University.

Four Courses Offered. An increase of 26 per cent has been shown in the enrollment of the evening vocational school at Greensboro, N. C. Courses are offered in plumbing, electricity, architectural drawing, and automobile mechanics.

(Concluded on Page 31a)

(Concluded from Page 28a)

Offer Five Vocational Courses. Five vocational courses in trade work for architects, machinists, tinners, and carpenters are being offered in the evening school at Austin, Tex. The courses comprise architectural drawing, sheet metal drawing, steel square work, machine shop work, and cabinet-making, and classes are held twice each week.

Industrial Mechanics Courses Offered. Industrial mechanics courses are being offered in the academic high schools at Detroit, Mich., as a means of meeting the demand for industrial information by persons in professional and commercial pursuits. The principal industries represented are building, electricity, construction, and woodworking. The courses are arranged to cover four semesters and the instruction is given in general shops with a variety of equipment. A total of 441 students have been enrolled in these courses during the last year.

Open Classes for Tradesmen. Classes in blueprint reading, paper-hanging, and oxy-acetylene welding have been opened at Boise, Idaho, for the benefit of tradesmen engaged in these occupations. Additional classes in automobile mechanics, house wiring, and electric motor repair are planned in the near future.

Organize Industrial Class for Boys. The Lyons high school at Lyons, Iowa, has organized a general-industrial class for boys. A recent survey of the community showed that 23 boys are placed annually in industrial employments such as the building trades and woodwork industries.

Evening Industrial Courses. Evening courses in shop mechanics, mechanical drawing, and use of the steel square are being offered in the Alabama School of Trades and Industries at Gadsden.

New Equipment Installed. The part-time school at Ponca City, Okla., has been improved through the addition of $4,000 worth of new equipment. The machine shop has been enlarged by the addition of three engine lathes, an acetylene generator of large size installed, a blast furnace provided, new electrical apparatus installed, and a vulcanizing outfit provided.

Vocational Courses Added. Classes in electricity and plans and estimating have been introduced in the evening school at Arkansas City, Kans.

Introduce Cooperative Plan. The cooperative plan of industrial education is to be adopted by the printing section of Stout Institute, Menomonie, Wis., during the next semester. The scheme of education if worked out successfully, aids the printer seeking a position as an instructor. The trade experience gained through the cooperative plan would enable students to decide more accurately what they are interested in and what they are best fitted for.

Vocational Guidance. At Cranford, N. J., vocational guidance has become a topic of considerable interest. Prof. Clarence E. Partch, of Rutgers College, will direct this phase of the work this winter under the direction of the board of education. Mr. Partch has arranged a series of lectures for teachers and is using the Harvard vocational guidance tests in directing the work of seventh and eighth grade and high school pupils in order to determine the fitness of these children for certain vocational lines. The subject will also receive some attention in connection with community civics in the upper grades and the high school.

Industrial Arts Activities Successful. Special activities as art work, manual training, printing and shop work have proven successful at the McKinley School, Newark, N. J. One of the platoon type schools, as well as the McKinley all-year school has had opportunity to give the special subjects a try-out. In the McKinley school, pupils in the dull normal group are given a course adapted to their needs, giving emphasis to the manual arts and reducing the time given to purely academic subjects. Drawing has been a popular subject and printing is one of the alternating subjects, giving opportunity for a practical application of the training in design and color. Linoleum block printing has been carried out under the direction of Mr. Frederick A. J. Braun of the printing department, and cover sheets for the school magazine are designed and printed in colors by the boys of the printing class.

Vocational Survey. A vocational survey of Oakland, California, will be conducted under the direction of Mr. L. B. Travers in preparation for a trade school to meet the needs of the industries and transportation.

Will Plan Courses. Mr. George F. Haller, of Berkeley, Calif., has been engaged by the Sweti Union High School at Crockett to plan the courses to be offered in the new high school building. Mr. Haller has begun a study of the trades used in the smelting, brick, sugar, and oil-refining districts to determine the nature and extent of the training required.

Mrs. Alex. Caldwell has been appointed superintendent of the new vocational school for girls at Tullahoma, Tenn. Mrs. Caldwell, who succeeds Miss Bessie Cox, was instrumental in the establishment of the school and has been in close touch with the work of the institution since that time. At present, the school houses 90 girls who are being trained along practical lines, for home making and general school instruction.

Every Manual Training Class Room *should have this Complete Set* of IRWIN BITS

THIS set of genuine Irwin Auger Bits, ranging in 16ths of an inch, from one-quarter inch to one inch, is deserving of a place in every well equipped manual training or industrial arts workshop.

The thirteen auger bits comprising the set are all Irwin Mainbor Bits, made with the solid-center principle originated by Irwin 41 years ago.

Kept intact in the original container—Borcase or Borkit—they will remain in perfect condition indefinitely.

Write to us, mentioning this advertisement, and we will be glad to give you details regarding special introductory offer.

Write for the facts today.

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"Largest Makers of Wood-Boring Tools in the World."

IRWIN *Auger Bits*

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

TURRET LATHE METHODS AS USED IN INDUSTRY AND THEIR RELATION TO THE SCHOOL SHOPS

The Warren Swasey Co., manufacturers of turret lathes of Cleveland, Ohio, are publishing a number of pamphlets on turret lathe methods. These pamphlets should be of interest to industrial arts teachers interested in machine shop work since they give valuable information on the turret lathe, and the methods used in small lot production.

Success in industry and commerce is primarily based on methods. In the machine shop, for example, where a large number of pieces must be machined to the same size, machines have been made to do this operation in the least possible time and the greatest amount of accuracy. These production machines were built only for those manufacturers.

Through careful analysis it has been determined that it is a paying proposition to have turret lathes installed when only a small number of pieces of the same size are to be machined, hence a large number of machine shops are installing turret lathes rather than engine lathes for production work.

What effect is this revolution in industry going to have on the machine work taught in schools? Are the schools teaching the fundamentals of machine shop work going to ignore the progress made in industry, or are they going to cooperate with industry as far as it is possible, always keeping in mind to give the student a broad training, yet fit him to earn his bread and butter?

Since industry has found it profitable to install turret lathes for small lot production, surely, schools training boys for industry, and colleges training engineers who eventually become leaders in industry, should acquaint the students with these machines through actual contact in a school shop.

It has been found profitable to set up turret lathes for as small a lot as eight hexagon studs. The total time to turn these eight on an engine lathe was 280 minutes against 117 minutes on the turret lathe, including set-up time. This is just one of the many examples that can be cited of the small lot production on a turret lathe.

Schools teaching advanced machine work owe it to the students to teach them the advantages of a turret lathe in industry through actual contact with the machine.—*F. W. Z.*

ONE CENT A MONTH INSURANCE PLAN AGAINST EQUIPMENT BREAKAGE

E. E. Parlin, Lawrence, Mass.

Some years ago a large jointer bottom was broken in the shop of the writer. The boy who had the accident was unable to pay for the damage. The instructor hesitated to requisition a new jointer because it was the wrong time of the year. Something had to be done and the plan now used was tried out with success.

The boys of the various classes were called together and discussed with the instructor many plans. It was finally decided to charge one cent a month or ten cents per school year, which was to protect each of the boys in case of accident to tools. Each class was asked to have an insurance collector whose duty it was to collect from all members of the shop class and put it into a fund.

If a tool is broken it is not hidden away, but is reported. All the boys know there is money with which to replace it. In this way the equipment is kept in good repair at all times and the honesty of the boys is guarded.

Any boy who does not care for the protection may be excused, but not once during the years it has been in force did anybody ask that privilege. It works as well in the town school as it does in the city school and for the past six years has been in use in the eight elementary and arts shops of the city of Lawrence, Massachusetts.

BUYERS' NEWS

Materials and Supplies for Weaving. The January and Wood Company of Maysville, Ky., has just issued descriptive material showing a very complete line of materials and supplies for school and home weavers. The material should prove of interest to schools which teach weaving and which are from time to time in need of materials and supplies for their classes. The firm has prepared some very practical helps for weavers showing styles, designs, and colors for woven products and has issued some special pamphlets telling the weaver how to work out different designs, how to attract profitable business, and how to obtain a suitable outlet for products.

The Maysville Guild of Home Weavers was organized a little over a year ago to furnish supplies to weavers and to provide an outlet for their products. A suitable sales primer has been issued as a means of teaching the school and the home weaver how to reach the public.

Changes in Position. The Columbian Vise & Mfg. Co., of Cleveland, O., has announced the appointment of Mr. Wm. W. Crowell, New York City, as export manager of the firm. Mr. Karl F. Lehnhardt, New York City, has been made chief representative of the metropolitan district's domestic trade.

The changes are due to the rapidly expanding business of the firm and the greatly widened use of the vises and other products of the firm.

JOINTING AND GLUE JOINTS

Mr. N. B. Rowe, in a recent issue of The Woodworker, discusses the subject of joints. He maintains that a good joint is half made if the stock is properly dried and conditioned; unless it is properly dried and conditioned, it is useless to expect a joint to hold.

Good jointing, said Mr. Rowe, can be as well done on an old type machine as on one of the latest type. Poor jointing can be done as easily on one of the latest and most expensive machines, if it is out of adjustment, as one of the old type in the same condition. The advantage of the new machine is that its output is greater, it is more easily adjusted, and is more positive in its action.

The essential point to understand in connection with a jointing machine is how to keep the beds and cutters in perfect condition. The outbed near the cylinder must be exactly the same height as the knives at their highest point, and both ends must be in line with each other when at the same height. The knives must be kept sharp and properly jointed, and as said before, must line up with the back, outfeed, bed. If the knives are not kept sharp, stock which is knotty or of spotty, hard texture will "ride" the knives more or less.

On the endless-feed jointer the proper amount of pressure must be kept on the stock if good work is expected. Judgment should be exercised in feeding also, and stocks of various thickness should not be fed in a mixed condition. The individual roll springs must also be watched to see that the rolls are exerting the proper amount of pressure against the work.

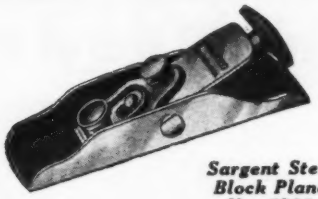
There are a great many types and designs of edge glue-joints. There are some who contend that a perfectly flat joint, properly glued, is the equal of any. On some woods this may be true, but all woods do not give the glue an equal chance to penetrate and form the thousands of tiny pore-barbs which bind the two pieces together. There are other types which give strength to a joint by the peculiarity of their construction.

Eastern Tennessee Meeting. The manual training teachers of Eastern Tennessee held a meeting on October 29th, with 43 teachers and supervisors in attendance.

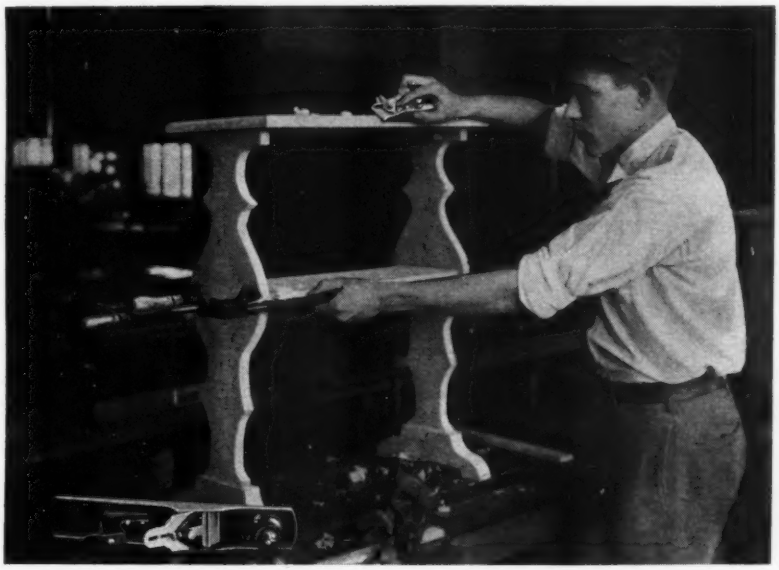
At the meeting it was brought out that the schools in the south have done some splendid work in manual and industrial lines. Many of these schools have been unhampered by tradition so that it has been possible for enterprising individuals to develop their departments in their own way. Prof. W. C. Wilson, of the East Tennessee Teachers' College, was the first one to undertake the training of teachers some sixteen years ago and a number of well-trained instructors have been turned out as a result. In the larger cities, the short unit try-out course is being offered in the junior high school, and this in turn leads to manual arts electives in the senior high school, or to strictly trade school courses as a part of the Smith-Hughes program.

Mr. Clyde H. Wilson of the University of Tennessee, as secretary of the Association, gave the results of an investigation carried out during the past year in which the averages of manual training teachers were determined. The information covered a number of points, including hours of work, number of students per section, teaching experience, and trade experience. The results of the study were of value in showing individuals how they compare with the average. A good deal of information on wage scales in some fifteen different trades was collected, which was passed on to the teachers for use in practical vocational guidance.

Officers elected for the next year are: Chairman, Mr. Cleburne Hatfield, Chattanooga; Vice-Chairman, Mr. Leroy Hyder, Morristown; and Mr. Clyde H. Wilson, Secretary.



Sargent Steel Block Plane No. 5206



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NO REASON now for anyone to work with unsatisfactory tools. In every class of tools there are leaders. Devised by workers who simply had to have something better than what they were using. Produced by manufacturers who have overlooked nothing that might better design and quality. Sold at prices which every worker can afford to pay.

Sargent Planes will help you to get better results. Quicker results, because of their simplicity of adjustment and ease of handling. The Auto-Set has a feature found in no other plane The cutter may be removed, sharpened and replaced without changing original adjustment. With this and the small Steel Block Plane you can do practically every finishing job that comes to a school or home work-bench.

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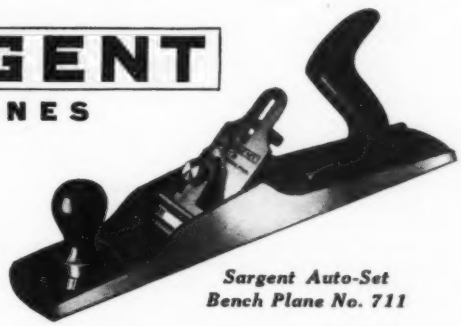

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Student printers should be taught to take advantage of every factor which makes for increased production at lower cost.

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12x18 Kluge Craftsman Efficiency Unit

NEW BOOKS

Glass and Glazing

Emanuel E. Ericson. Cloth, 12 mo., 146 pages. Price, $1.75. Manual Arts Press, Peoria, Ill.

The average shop teacher considers glazing a very minor part of the instruction of carpentry or furniture making, and for that reason he misses an opportunity of familiarizing his classes with an important group of operations of which every carpenter and home owner should be master. Incidentally, the teacher loses the opportunity of teaching most interesting related facts on the history, manufacture, and right uses of glass and mirrors.

The present book contains in the first part, practical information on the classification of window and plate glass, and its cutting and setting, and in the second part describes the making of window and plate glass and mirrors. A final chapter tells the story of glass from the earliest Egyptian times to the present.

Essentials of Mechanical Drawing

William Wirt Turner. Cloth, 168 pages, illustrated. Price, $2, net. John Wiley & Sons, Inc., New York City.

One year of work, introducing the high school student to the graphic language, is provided in this book. The introductory chapters on instruments and preliminary instructions are quite complete. Orthographic projection is next taken up, and chapters on pictorial drawing, geometric construction, projections, intersections and developments, freehand sketching, and miscellaneous problems follow. Machine drawing is emphasized. Inking is introduced at an early point. Copying plates is discouraged and visualization is insisted upon. The appendix contains much practical material, tables, corrections, etc. The drawings are uniformly fine.

Elementary Steam Engineering

By E. V. Lallier. Cloth, 288 pages, illustrated. Price, $2.50. D. Van Nostrand Co., New York City.

While this book is addressed principally to experienced men engaged in the operation of steam power plants, it will serve equally for young men who are preparing to enter this important occupation. Fuels, boilers, steam engines, auxiliary apparatus, are treated very fully from the standpoint of design, construction and operation. The mathematics of the subject is handled rather simply. A final chapter discusses the principles of internal combustion engines, particularly the Diesel and similar power-plant types. The book should appeal especially to night classes of mature students.

PUBLICATIONS RECEIVED

Layouts and Equipment for Automobile Shops. By Joseph M. Hall. Bulletin No. 109, Trade and Industrial Series No. 31, May, 1926, issued by the Federal Board of Vocational Education, Washington, D. C. This pamphlet deals with the garage type of school shop and is intended for school architects, school superintendents, and supervisors of trade and industrial education, who may be called upon to plan shops and equipment for automobile repair. It contains complete layouts and equipment for automobile school shops, including electrical room, welding room, radiator room, battery room, and repair shop.

Modern Methods of Measurement. Report of the Congressional Committee on Coinage, Weights, and Measures. Hon. Fred Britten, Chairman. Consists of extracts from congressional hearings on the Britten metric bill.

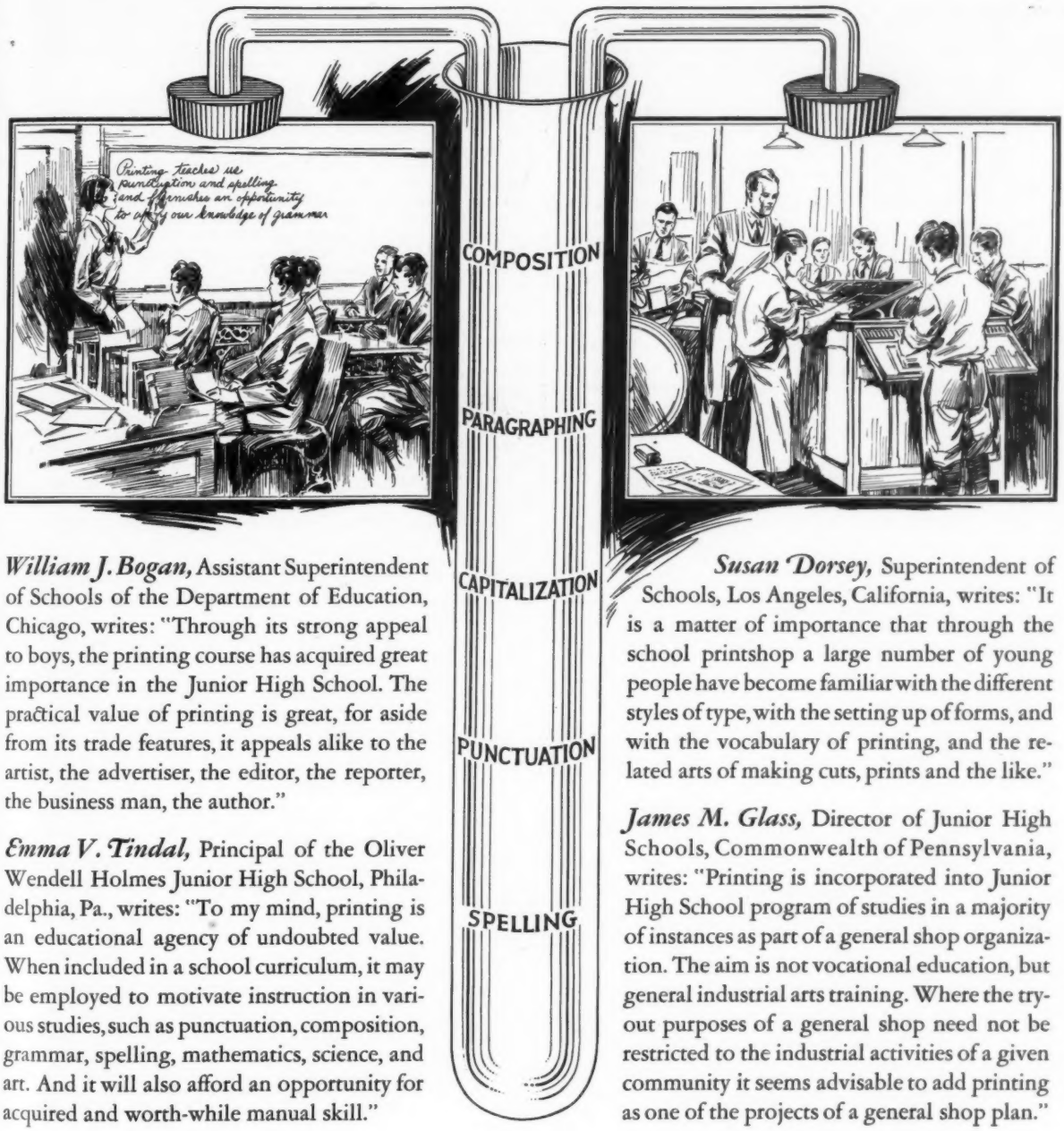
Suggested Courses of Study in Mechanical Drawing for Secondary Schools. Art Education Bulletin No. 47, 1926. Issued by the State Board of Education, Hartford, Conn. The course is designed to cover four years of work in periods of forty to eighty minutes' duration. It offers a definite, organized arrangement of subject matter, with a clear statement of aims and objectives, with the aim of assisting and guiding the teachers of the state in planning their respective courses of study. For the first year, the course offers work in the use of instruments, lettering, geometric construction, shop sketching, instrumental drawing, and blueprint making; the second year offers orthographic projection; the third year offers shop sketching, working drawings and layout work; and the fourth year, detail and assembly drawing and mechanical motions.

Power on the Farm. An address delivered before the Academy of Political Science, New York City, in November, 1926.

Suggestive Course of Study in Home Mechanics and Simple Mechanics for Seventh and Eighth or Ninth Grades. By C. V. Lindeman. Paper, fourteen pages. Issued by the mechanic arts department, State Normal and Industrial School, Ellendale, N. D. The course aims to develop in the pupil interest, thought, initiative, self-reliance and a certain amount of skill, as well as to impart information concerning industry and materials. The outline gives the plan of organization, a list of the required tools and materials, and a rather complete outline of suggestive problems in woodwork, electrical work, benchwork and metal work, as well as a supplementary list of miscellaneous jobs. There is a list of references taken from books, bulletins, and magazines.

THE TEST OF PRINTING

The Conclusions of Prominent Educators



William J. Bogan, Assistant Superintendent of Schools of the Department of Education, Chicago, writes: "Through its strong appeal to boys, the printing course has acquired great importance in the Junior High School. The practical value of printing is great, for aside from its trade features, it appeals alike to the artist, the advertiser, the editor, the reporter, the business man, the author."

Emma V. Tindal, Principal of the Oliver Wendell Holmes Junior High School, Philadelphia, Pa., writes: "To my mind, printing is an educational agency of undoubted value. When included in a school curriculum, it may be employed to motivate instruction in various studies, such as punctuation, composition, grammar, spelling, mathematics, science, and art. And it will also afford an opportunity for acquired and worth-while manual skill."

Susan Dorsey, Superintendent of Schools, Los Angeles, California, writes: "It is a matter of importance that through the school printshop a large number of young people have become familiar with the different styles of type, with the setting up of forms, and with the vocabulary of printing, and the related arts of making cuts, prints and the like."

James M. Glass, Director of Junior High Schools, Commonwealth of Pennsylvania, writes: "Printing is incorporated into Junior High School program of studies in a majority of instances as part of a general shop organization. The aim is not vocational education, but general industrial arts training. Where the try-out purposes of a general shop need not be restricted to the industrial activities of a given community it seems advisable to add printing as one of the projects of a general shop plan."

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F. K. PHILLIPS, *Manager,* EDUCATION DEPARTMENT

AMERICAN TYPE FOUNDERS COMPANY

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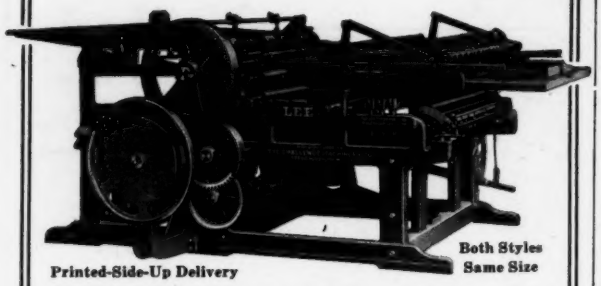

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PERSONAL NEWS

Mr. Joseph C. Park, director of the Industrial Teacher Training Department of the Oswego, N. Y., State Normal School, has a leave of absence for the second semester. He will spend five months on the continent of Europe, visiting various countries. His trip will extend to the Near East and he will spend some time in Turkey, Palestine, and Egypt.

Mr. George Engs, who was employed in the part-time school at Pittsburgh last year, has been engaged by the Oakland, Calif., part-time school to do similar work with a special group of boys. New equipment has been added for woodwork and Mr. Engs has begun some large projects similar to the clubhouse he built with his boys last year. For the girls, a new course in beauty culture and personal hygiene has been added, with Miss Marie Schroepfer as instructor.

Miss Elizabeth Favor has been appointed to succeed Miss Ruth Turner at the Sacramento, Calif., part-time high school. Other appointments were Mr. H. H. Crawford and Mr. J. T. Peterson.

Mr. H. E. Hess, a specialist in auto-mechanics and formerly head of the department at the Lincoln high school, has been asked to develop the new department at the Wiggins Trade School, Los Angeles. Mr. Hess is succeeded at the Lincoln high school by **Mr. H. C. Hurlbut** and **Mr. R. J. Wilson** takes the place of Mr. Hurlbut at San Pedro. **Mr. L. A. Miller** is the new instructor in plumbing, and **Mr. E. C. Waite** is instructor in interior decorating, paperhanging, and painting in the school.

Mr. E. A. Ferns, of Flint, Mich., has accepted a position as instructor in the Northern Normal School at Marquette.

Mr. William Galloway, of Saginaw, E. S., Mich., has become director of vocational education at Dubuque, Ia.

Mr. D. G. Young, of the industrial department in the Berkeley (Calif.) high school, has been promoted to the head of the department, to succeed Mr. G. F. Haller. Mr. Young is succeeded by Mr. E. A. Moffitt.

Mr. R. H. Behrens, formerly of the Monterey, Calif., high school, has become a member of the staff of the Berkeley high school. Mr. Charles E. Draper has taken the position vacated by Mr. Behrens.

Mr. John Morrill, formerly of Alameda, has become instructor in vocational woodwork in the Berkeley, California, high school.

Mr. James A. Wood has become instructor in electricity in the new Alameda, California, high school.

Mr. Henry E. Dyson, of Sonoma, Calif., is a member of the staff of the junior high school, Oakland, Calif.

Mr. James M. Dow, of Vallejo, Calif., has entered the industrial department at Oakland, Calif.

Mr. R. P. Madeley, of Atascadero, Calif., is teaching in the Elmhurst Junior High School at Oakland.

Mr. James Boyd has returned to Oakland, Calif., after a year's absence spent as electrical instructor at Rochester, N. Y.

Mr. Lloyd Sparks of Porterville, Calif., is teaching at San Jose.

Mr. Joseph Longfield, of Caspar, Wyo., is instructor in automobile mechanics at Hanford, Calif.

Mr. Donald L. Fair has been appointed head of the mechanical arts department at the Reedley, Calif., high school.

Trade Extension Education Extended. Mr. C. H. Kent, formerly in charge of the training of trade teachers for the Nevada State Board of Vocational Education, has recently taken over the promotion of practical trade extension classes for trade workers at Reno. The classes which started on November 4th, consisted of men from the electrical, carpentry, and automobile mechanics trades. A class in salesmanship for retail grocers, a class in framing, and two classes in electricity were formed. The automobile mechanics are taking machine-shop practice related to their trade under the direction of a practical machinist.

A class of fifteen machinists has been formed at Las Vegas, with Mr. D. G. Stewart in charge. The group studies blueprint reading and mathematics. Mr. A. E. MacArthur conducts classes in mathematics and mechanical drawing with over fifty enrolled. In addition to these, there are demands for classes in welding, air-brake repair, framing, and sheet metal.

At Sparks, an evening class for machine shop workers has been conducted for the fifth consecutive season, with Mr. W. E. Hastings in charge.

Architectural Drawing Class. A class in architectural drawing has been organized in the evening school at New Kensington, Pa., with Mr. Stephen Powell in charge. The class meets two nights each week, from seven to nine o'clock.

A number of new courses have been added to the evening school work, among which are elementary electricity, automobile operation, accounting, foreman training, business law, and salesmanship.

Trade School Nears Completion. The eleven-story Wiggins Trade School at Los Angeles, California, is nearing completion. The building takes care of 7,500 students daily and provides instruction in thirty different trades.

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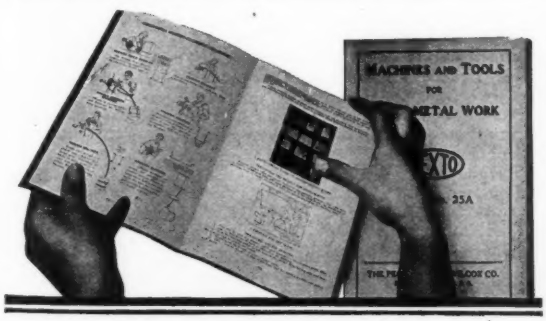

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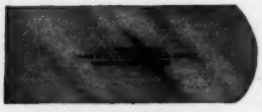
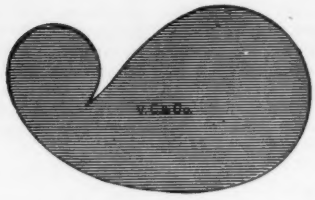


Convex and Square

No. 5. Size 1½ x 4 inches



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NEWS NOTES

The position of supervisor of manual arts and drawing at St. Louis has been eliminated and in its place there are now three positions of supervisor of manual training, supervisor of household arts, and supervisor of drawing.

The salary schedule provides a salary of $2,800 the first year, $2,900 the second year, $3,050 the third year, $3,200 the fourth year, $3,400 the fifth year, $3,600 the sixth year, $3,800 the seventh year, and $4,000 the eighth year.

Job Finding in California. In a recent survey of 54 schools of California, it was found that every one had some kind of placement program. In most cases the placement was done through a bureau established in the part-time school. Berkeley, Long Beach, Los Angeles, Oakland, Sacramento, San Jose, and Stockton are some of the cities which have for a number of years maintained organizations for the placement of young workers.

Placement Director Added to Trade School. A coordinator and director of placement has been added to the staff of the Wiggins Trade school at Los Angeles, Calif. The director will have in charge the placement of milliners, dressmakers, costume designers, power-machine operators, beauty parlor operators, and interior decorators.

Cooperative Courses Started. Since the opening of school in September, a cooperative part-time course has been offered in conjunction with the Axelson Machine Works at Huntington Park, California. Under the plan, twenty boys receive training as apprentices in machine shop work at the plant, and in alternate weeks, their high school training at the high school. Mr. Victor Capon, who has been in charge of the apprentices at the plant, has been continued as instructor of the group at the plant, and at the same time, is a member of the teaching staff of the high school. Mr. H. A. LeBihan, head of the industrial arts department in the high school, is in general charge and acts as coordinator for the school. At present there are eight in one group and five in another who are at work in the plant and at the school. The number is to be increased to ten in each group.

Cooperative Course Proves Successful. A cooperative part-time course was introduced in the high school at Bristol, Conn., last year, which has proven quite successful. Under the arrangement, the boys enter the course in the first year, spending their entire time at the high school. The last three years the boys alternate every two weeks in the factories of the city. At the end of the four-year course each boy is given the rating of a journeyman in wood, metal work, or drafting. The boys are paid a total of $1,566 during the four-year period.

Form Sectional Groups of Teachers. At the last meeting of the West Virginia Manual Arts Teachers three sectional groups of teachers were formed. These include the Monongahela Valley group, the Northern Panhandle group, and the Kanawha Valley group. The teachers in these sections meet at different times during the year, prepare their own programs, and carry them out. These gatherings where ideas are evolved, plans outlined and teaching problems solved result in professional growth and attitude.

At the close of the meeting, Mr. E. J. Hawkins, of Fairmont, was elected chairman of the West Virginia Association.

The Metric Advance. A move to standardize and decimalize the yard, quart, and pound on the world metric basis. By Aubrey Drury. The metric standards are considered the world's greatest practical success in weights and measures. They are practical because they are precise and unvarying throughout the world. The outstanding advantages are that the metric units are on the convenient decimal basis and that they are world-wide in use and utility. Under the proposed metric standards bill, presented in Congress by F. H. Gillett of Massachusetts, any manufacturer is permitted to use within his own plant any system he prefers; it is only in dealing with other people, or with the public, that he must use the metric system. This provision in the bill is intended to eliminate a feature to which objection has been made in the past.

Trade School Work in Los Angeles. The Frank Wiggins Trade School is operated as a full-time vocational trade school, with day and evening classes at the Grand Avenue building and at the East Tenth Street branch.

At the Grand Avenue Day School courses are offered in plastering, bricklaying, painting, interior decorating, printing, linotyping, monotyping, power machine operating, telegraphy, beauty culture, dressmaking, millinery, and alteration work. At the Tenth Street Branch work is offered in bricklaying, plumbing, sign painting, commercial art, and tile-setting.

The Wiggins Trade School will be ready about February 1, 1927, and will provide one of the most complete and modern vocational schools in the country. The plans for the new building provide for an extensive program of vocational subjects open to all the youth of the city.